

The AUTOMOBILE

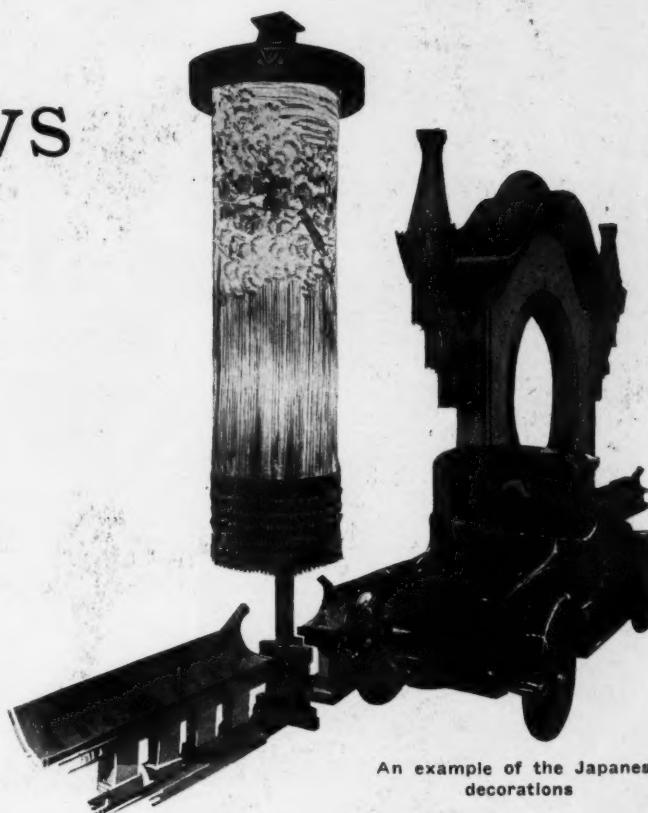
Chicago Draws the Curtain

33½% Gain in Attendance Over 1915 at Opening of Sixteenth Show—Decorations a Great Success—80 Gasoline Car Exhibitors —7 Electrics—52 Stripped Chassis

CHICAGO, ILL., Jan 22—Chicago's sixteenth annual automobile show opened this afternoon promptly at 2 o'clock with the usual crowds waiting at the doors of the Coliseum and the armory as in former years, and within one-half hour the entire lower floors were filled, setting at rest any thoughts as to a possibility of waning interest in the automobile in the Windy City and in the great Mississippi valley that have for a couple of years been enjoying unparalleled prosperity due to bumper crops and war-time prices. To-day's and to-night's attendance has not brought a symptom of indication of waning interest; rather, the curve is shot upwards in keeping with automobile production, the price of materials, the price of gasoline and the price of tires. Official figures to-night show a paid attendance almost 33 1/3 per cent in excess of last year, with a much larger attendance of out-of-town dealers, many of whom have arrived days ahead of last year, the only reason for which is found in the present shortage of freight cars to ship automobiles from the factories to the dealer.

50% More Dealers

The freight car problem in itself is enough to warrant dealers hurrying up, but there is a little nervousness due to the difficulty of getting deliveries, the rising price of materials slowing this up. The



An example of the Japanese decorations

prospects are that before the end of the week the registration of dealers will be fully 50 per cent ahead of last year. Those arriving early hope to get the early-worm percentage of deliveries.

A Japanese Garden

Chicago's four-building show, always renowned for its decorative effect, is up to standard, all four buildings having walls and roofs entirely covered, giving a Japanese garden effect, with pagodas, Japanese tea girls, and Japanese scenes forming the roof draperies, the gallery fronts and, in short, concealing every bit of the walls. The entire interior of the Coliseum, the Coliseum annex, the Armory and the Greer building are in reality scenes snatched from the Mikado's realm, with more realism added by Japanese lettering on all signs, excepting the miniature electric ones that hang above the accessory exhibits. There are huge Japanese pillars filled with electric lights forming the major effect on the main floors; myriads of bright-colored Japanese flowers on the mural draperies; Japanese arches, Japanese

January 27, 1916



INTERIOR view of Coliseum taken from one corner of the gallery, showing the sea of lights and the general scheme of decorations, huge illuminated Japanese lanterns, typical Japanese arches with the enormous circle, and Japanese screens on which the name of the exhibit is carried out in miniature Japanese letters.



One side of the First Regiment Armory, showing every detail of the decoration. The hanging round the gallery gives a good idea of the richness of the effect

vases: in fact it is a typical Mikado scene, as typical as if taken from an act of the famous Gilbert and Sullivan opera.

A Typical Chicago Show

It is a typical Chicago show with all of the old-time Chicago show characteristics, Pneumonia Alley connecting the Coliseum with the Armory, long lines of demonstrating cars on Wabash Avenue outside the Coliseum, more long lines on Michigan Avenue outside of the Armory; demonstrating motor trucks of energetic makers filling the streets and carrying their monster signs; hotels filled with exhibitors who could not get into any of the buildings; and vacant stores along Michigan Avenue are covered with improvised electric signs telling of new accessories or car makers who could not obtain space within any of the four buildings.

Then, too, the available Chicago hotel accommodation was taken up a day or more before the show started, theaters are nearly all sold out, railroads are running beyond capacity, in short, the entire West is stirred up with the automobile's greatest week of the year.

This year's show is unique in the long list of sixteen annual

exhibitions staged in the historic Coliseum, the scene of so many national political conventions and historic in many other regards. For the first time in its career the Chicago show has few additional cars over the New York show. For years Chicago has come forward with a score or more of new exhibitors not seen in New York; there have also been numerous late body ideas that were not ready for the Gotham exposition; there were always many new motors, and a host of other new components and accessories. This year there is only one brand new car uncovered, this honor going to the Champion from Wabash, Ind., a conventional block type four-cylinder chassis at \$750. There are, however, a few makes such as Glide, Farmack, Sun, a new Detroiter body and a new Halladay, details of all of which have already appeared in these columns.

But One Miniature Type

For the first time Chicago is practically free of anything in the complete automobile partaking of the cyclecar, or motor buggy idea, the Gadabout being the only miniature type seen. In former years Chicago distinguished itself by the first and largest exhibit of motor buggies, then came other days when the cyclecar held the novelty stage, but to-day it is as conventional a show as ever staged, conventional cars, and conventional accessories.

Last year there was a crop of new eight-cylinder motors

not seen at New York; this year there is not a new motor with the possible exception of Continental showing one of its recent six-cylinder models which is seen for the first time at a show this year, as Continental did not exhibit at New York. There are no new eights, no new twelves; in fact, this feature is in strong contrast with a year ago, when there was a veritable landslide of premature eights, which were not ready for New York but were hurried into readiness for Chicago. For the first time in its career, the Chicago show is more of a duplicate of the New York show than ever before, with the possible exception of some body styles not shown at the Grand Central Palace.

More Car Exhibitors Than at New York

When the show is compared numerically with the recent New York exhibition, it is discovered that there is one more gasoline car manufacturer exhibiting at Chicago, the total for the Windy City being eighty, as compared with seventy-nine at the Gotham display. There are also two more electrics at Chicago than at New York, the respective totals being seven and five. New York, however, leads in the total number of gasoline cars and chassis on display, having 307 to Chicago's 294. Last year Chicago had 254 gasoline cars and chassis on exhibition.

Electrics in Armory

Chicago is the greatest electric city in the country; it is known as the home of the electric and, as usual, has the center of the armory set aside as an exclusive electric exhibit. This exhibit is smaller than usual with seven different makes, showing in all twenty-two different cars and a couple of chassis. Contrasted with former years, this electric dis-

play is unique by reason of an entire absence of gaudy colors and interiors, it being tradition to work all the colors of the rainbow into some of the cars and the upholstery.

This year dark colors dominate, with gray-striped interiors. Waverley has the sole exception, being a brougham with broad-striped upholstery. The body colors are generally dark with the possible exceptions of the green Milburn roadster, a blue Ohio brougham and a Baker with dark-gray body and panels and light-colored wire wheels.

Wire Wheels and Cord Tires Popular

There is a preponderance of wire wheel equipment on the electrics, Detroit showing four out of five with wire wheels, Milburn two out of three, Baker and R. & L. two out of four, and Ohio, Woods and Chicago not showing any. The seven electric makers exhibiting are Baker-R. & L., Detroit, Ohio, Milburn, Chicago, Waverley and Woods. There is a preponderance of pneumatic tires, seventeen out of the twenty-four vehicles and chassis using them. Practically all of them are cord types.

Eights Gain 400 %

Reverting to gasoline cars, this show serves well to demonstrate the rapid growth of the eight-cylinder car during the past year and also to show the progress made in twelve-cylinder types. There are forty-two eight-cylinder cars and chassis as compared with eleven a year ago, a 400-per-cent increase. The twelves not represented a year ago are now represented by eleven cars and chassis, the exact representation that the eight had a year ago. This coincidence suggests what the relative figures will be a year hence. Six-cylinder cars and chassis have increased from 109 last year



The Japanese decorations of the Chicago show are carried out with extreme thoroughness and the effect is as handsome as could well be desired. Besides using many pieces of Japanese handicraft of many kinds, there is lavish employment of special paintings on a very large scale. These, combined with hangings and with garlands and sprays of artificial flowers, give the decoration a completeness seldom equalled.



to 135; and four-cylinder types have dropped from 133 a year ago to 106 at present. So is the trend of events outlined by THE AUTOMOBILE for Dec. 30, a dropping in the number of different makes of fours and the increase going to sixes, eights, and twelves, all gainers.

More Polished Chassis Shown

The present show demonstrates that the use of polished chassis as show attractions is on the increase, and that more of these can be used to advantage is indicated by the crowds constantly found around these exhibits, and particularly those where the demonstrator gives periodical lectures on the job. There are fifty-two chassis this year, as compared with forty-four last year and as compared with fifty-six at the New York show this year. The Studebaker gold-plated chassis now making the complete circuit is attracting many, as are such cutaway exhibits as Overland, Cadillac, Hupmobile, Reo, Saxon, Chalmers, Marmon, Stearns, Buick, Chandler and others. A tabulation contrasting the car exhibits of the present show with those of former years shows

those concerns that rely on chassis exhibits.

Five-Passenger Bodies Lead

The Chicago show offers interesting contrasts with New York in body exhibits, and, while there are scores of bodies seen at New York and also at Chicago, there are always many different styles seen at the Coliseum. In the high-priced field New York invariably leads Chicago, many of the Chicago jobs savoring more of the utilitarian type. The open five-passenger type is still a leader, with sixty-four different styles shown. It is closely followed by fifty-seven styles of six- and seven-passenger designs. There has been a big gain during the year in the closed types, such as detachable winter tops, touring sedans, etc.

Eighteen Demountable Tops

There are eighteen demountable winter top styles as compared with one a year ago, when Kissel, the pioneer in this design, held sole sway. The West is appreciating this type of body, the demand being so great that nearly a dozen Chicago dealers and distributors have added body-building departments for the production of these winter types. The sedan type has increased but little, from seven a year ago to ten this season, these figures, however, not truly representing the increase in these types, as several dealers are exhibiting sedans in their salesrooms, due to lack of space in the exhibit space at the show.

Town Cars Gain

The town car following has increased very perceptibly during the year; in fact, Chicago has made rapid strides during the past year as a closed-car town. This closed-car demand is not local to Greater Chicago, but visiting dealers speak generally of the increased use of the automobile throughout the winter and the natural increase in demand for closed types. Limousines are not making gains; in fact, they are a little behind a year ago. Coupés have made little progress. Thirty-two different makes show wire wheels on all or some of their show cars, this being over 40 per cent. Cord tires are on sixteen different makes. In other words,



How the Japanese effect was worked into the accessory section

20 per cent of the exhibitors are showing cords on some or all of their cars and chassis exhibited.

Commendable Variety in Colors

From a body color viewpoint the present Chicago show is the brightest in the long line of sixteen annual exhibitions. Manufacturers are displaying commendable judgment in not making the show too much like a morgue by having everything in black. During the past fall THE AUTOMOBILE has carried on a consistent campaign for more color in car bodies, on the ground that black is one of the poorest body colors, being the easiest to dirty and the hardest to keep clean.

Color Options Increasing

THE AUTOMOBILE has made a canvass of car manufacturers on this question of car color, and the figures show that color options are rapidly increasing, not only with the high-priced makers, but many medium-priced car manufacturers are realizing that it is often possible to sell a car with a color option that would not be sold without it. Some dealers selling cars listing at under \$1,000 have during the past fall instituted the plan of repainting bodies on new cars, giving the buyer several options, together with such additionals as slip covers and tire covers to match at an additional cost of \$100 or thereabouts. Many sales have thus been made that otherwise would have gone to higher-priced cars giving some color options.

Brightness Without Gaudiness

Standing in the gallery of the Coliseum and looking over the couple of hundred cars on the main floor, the scene is much more brilliant than in former years, and, while more brilliant, it is not that useless gaudiness of former shows, but, with a few exceptions, the colors are practical colors and the interior finish and upholstery are feasible for general use.

Large-production manufacturers, such as Overland, Buick, Studebaker, Maxwell, Dodge and Reo, almost invariably have dark colors exclusively. Black dominates, but there are examples of dark greens and a few dark blues.

In the galaxy of color at the show Velie leads in novelty with three special show cars—one in red, one in white, and one in blue—a publicity scheme that is immediately apparent yet effective as a show exhibit. Among the other exhibits, the grays predominate. These are of all shades from gunmetal tints to battleship hues and to others much lighter. The broad striping usually found on them is absent this year.

In the brighter colors, reds, oranges, yellows and creams are popular. There are many maroons, many wine-colored bodies, and several combinations of cream and chocolate tints. Mercer has a bright yellow, while Scripps-Booth, Stutz and Case have orange-yellows. There are a few whites that are more for show purposes, such as Paige, Inter-State and Hudson, these generally having the broad black-and-white-striped upholstery.

Many Have Color Options

Looking next at color options given by makers, it is seen that the option policy is making good headway. There are nearly ten concerns that offer a wide range of colors, these including Packard, Winton, Locomobile, Mercer, White, Fiat, Pierce-Arrow and Mitchell on its closed cars.

Stutz shows bright colors on all models—two reds, a yellow, and a blue. This company gives six color options at a slight extra cost, these colors including maroon, gray, ultra-marine blue, white, and battleship gray in addition to those on exhibit.

National is a believer in colors, and for an extra price gives a choice of five, including gray, blue, cream, white and maroon. Scripps-Booth offers four colors: Black, gray, royal blue and English biscuit.

There are many concerns offering two or three color combinations. Thus, Oakland has green, gray and blue; while Chevrolet, Oldsmobile, Saxon, Buick and Westcott, have two each, at extras ranging from \$25 to \$50.

Other Standard Colors

Among some of the standard colors other than black being offered at present are: Chandler, blue; Marmon, blue; Kissel, blue; Studebaker, blue; Cadillac, Reo and Haynes, green; Willys-Knight, blue, and Paige, blue. These concerns offer other color combinations at extras that extend from \$30 to \$100.

Some color schemes seen at the show which tend to show the effort to get away from black are: Marion, four maroon cars; Cole, two greens, a red and a light yellow; Auburn, one dark green; Pathfinder, one yellow, one red, and two dark types; Lexington, a gray, a green, and a red; Hollier, a dark red and a black; McFarlan, a dark maroon; Premier, two grays and a green; Briscoe, a green, a cream, a red, and a light brown; Apperson, a blue, a gray, and a maroon; Moon, a gunmetal, a gray and a black; Chalmers, two wine-colored styles; Hupmobile, a gray, a dark brown, and two blacks; Marmon, grays; and those showing dark types, some blacks and others very dark greens are Elcar, Austin, Paterson, Allen, Detroiter, Glide, Grant, Metz, etc.

Taking first the gasoline cars it is found that eighty makers of this class of cars are represented as compared with

seventy-nine at the New York show. Two hundred and ninety-four chassis are on display at the Chicago show as against 307 at New York, these being divided in such a way that the six-cylinder types lead with 135, the four-cylinders ranking second with 106 and the eights and twelves numbering forty-two and eleven respectively. New York had 136 sixes, 108 fours, thirty-nine eights and thirteen twelves. Of the 209 chassis shown at the Chicago show, fifty-two are stripped.

Two hundred and forty-two body types are shown. Of these 187 are open cars, sixty-five being five-passenger, fifty-seven six- and seven-passenger; thirty-three two-passenger; twenty-three three-passenger and ten four-passenger. In the closed car group fifty-five models are exhibited, seven being coupés, ten sedans, eighteen demountable tops—these include two-, three-, four-, five- and seven-passenger capacities—ten limousines, one landaulet, five town cars and two berlines. Putting these figures in the balance with New York, Chicago leads in the touring car class of exhibits by four, in demountable tops by three, in coupés by one, and in berlines by one. New York was ahead of Chicago in roadster types, having seventy-seven as against Chicago's sixty-six. In the cabriolets New York had five—a lead of three—in limousines, eleven—a lead of one; in landaulets, three—a lead of two. In the town car types they were even, each having five.

There are forty more gasoline cars on display to-day than there were at the 1915 show. One hundred and thirty-three fours were shown last year, as against 106 this year. Six-cylinder models show a material gain over last year, when only 110 were exhibited, compared with 135 this year. As an evidence of the gain in popularity of the eight it may be said that there are forty-two chassis being shown, whereas, only eleven were at the 1915 show. Of course, the twelves, being a 1916 development, no comparison is possible with other years.

More touring cars were displayed at the 1915 show than are to be found on the floors of the Coliseum, Greer Building and Armory to-day, although the difference is but one. Of the roadsters there were only forty-two last year, compared with sixty-six this year, but this is accounted for largely perhaps by the fact that three- and four-passenger bodies come under roadsters this season. In the other body types little difference is to be found in numbers as between the 1916 and 1915 Chicago shows.

The use of wire wheels seems to be on the increase, since

NUMBER OF EXHIBITS	
Number of manufacturers exhibiting.....	80
Total number of chassis exhibited.....	294
Number of four-cylinder motors.....	106
Number of six-cylinder motors.....	135
Number of eight-cylinder motors.....	42
Number of twelve-cylinder motors.....	11
BODY TYPES (OPEN CARS)	
Five-passenger	64
Six and seven-passenger	57
Two-passenger	33
Three-passenger	23
Four-passenger	10
Total	187
BODY TYPES (CLOSED CARS)	
Coupes	7
Sedans	10
Demountable tops	18
Cabriolets	2
Limousines	10
Landaulets	1
Town cars	5
Berlines	2
Total	55
Number of stripped chassis.....	52
Makers using wire wheels.....	32
Houk	23
R.-W.	4
F. & H.	1
Makers using cord tires.....	16
Goodrich	10
Goodyear	6

thirty-two makers out of the eighty represented here are showing some, if not all, models so equipped. Of this thirty-two, twenty-three are Houks, four Rudge-Whitworths, two Freyers, or F. & W.'s, two Universals and one is Spanger. This shows that 40 per cent of the makers now are using wire wheels as stock equipment, or offer the purchaser an option, sometimes at a slight increase in price.

Cord tires are found on some of the models of 20 per cent of the manufacturers showing at Chicago. These are not stock on all models of all the makers exhibiting them, but are found predominating among sixteen separate exhibitions at the Chicago show. Of these sixteen, ten are Goodrich Silvertowns and six Goodyear cords.

Chicago Has Salon Show For First Time

CHICAGO, ILL., Jan. 24—A new thing in Chicago motor car circles is the Salon which opened Jan. 24 at the Auditorium Hotel. Although such an exhibition has been held for several years in New York at the Astor during show week, this is the first year that a similar affair has been staged in Chicago. The promoters are confident of the success of the venture, and seemed well pleased with the number of visitors during the opening hour.

Though naturally on a smaller scale, the Salon is similar in its scope to that held in New York this year. It includes several American cars as well as the foreign types. Those exhibiting are White, Simplex, Brewster, Peugeot and Lancia. The Salon has always been regarded as a high class body show, and the thought in exhibiting in Chicago is to get such an event started, because it is very certain that there is a place for it in Chicago.

Therefore most of the bodies on view at the auditorium are special designs that reflect the skill of the body makers. One of the White chassis carries an especially attractive Sedan upholstered in tapestry and having the new V fronted windshield that lends an unmistakable touch of class. One of the Lancias is also a closed type of Sedan design which is built with a very low roof to give a rakish appearance, this effect being accentuated by the slanting windshield.

A. C. H. Test Perfection Heater

A CERTIFICATE has just been issued by the Automobile Club of America covering a test made on the Perfection heater manufactured by the Perfection Spring Service Co., Cleveland, Ohio. The object of the test was to determine the effect of the heater on the power, fuel consumption and back pressure of the motor and to note the temperature of different points of the radiator surface.

The Perfection heater consists of a heat radiating element having six copper tubes connected to cast iron headers at each end. A casting which is clamped around the exhaust pipe between the motor and muffler and which contains means for by-passing a portion of the gases through the copper tube radiator is connected to the radiator by a flexible tube. In the casting is a butterfly valve which serves the double purpose of catching some of the exhaust gases and of shutting off the heater when its use is not desired.

Five runs were made on the motor with the heater on, off, with valve open and valve closed and a check run with the heater off again. The conclusions showed that the power output and the gasoline consumption of the motor were not adversely effected by the use of the heater; the back pressure was reduced when the heater was attached and its control valve opened; the back pressure remained the same as it was without the heater when the control valve was closed; the temperature was substantially the same in the center and outer tubes of the radiator.

Only One Quite New Car at Chicago

Ten Cars Shown for the First Time Contain Only One Surprise—Several Modifications in Design Noted on a Few Others

AS it was anticipated, there has never been a Chicago automobile show that differed so little in its exhibits from the New York exhibition. Not a single well-known manufacturer had a surprise to spring and there was not even an additional eight or twelve, to be found in motor form alone. Thus a review of the new cars at Chicago is mainly a list of the features of those few which have been altered in some small particular since their announcement in the summer or fall of 1915 when they were mostly described fully in *THE AUTOMOBILE*.

Of course, on the occasion of the Chicago show a number of cars are expected which on account of the lack of space or for other reasons did not appear at the season's opening in New York. Consequently it is not surprising to find at the Coliseum this week ten productions which have not been unveiled to the public gaze previously. These include the Monitor, Paterson, Detroiter, Glide, Dort, Halladay, Elcar, Farmack, Elgin and Gadabout. All of these have been made known to the public through descriptions in the trade papers and some of them are makes that have been on the market for a long time, such as the Monitor, Paterson, Detroiter, Glide, Halladay, while the Dort is a year old, and the Elcar is the product of a concern which has been delivering motor cars for many years, though the name is new. The Farmack and Elgin are making their initial appearance at the Chicago show.

In addition there is one car which has come unheralded to the Chicago exhibition, this being the Champion, produced by the Champion Auto Equipment Co., Wabash, Ind. The car is of the conventional small four type in most respects, but is featured by a special tire inflating arrangement such that any two of the tires can be pumped up at the same time while the car is on the road.

Though we are getting our first actual view of these cars, several of them have been described and illustrated in the Dec. 30 and Jan. 6 issues of *THE AUTOMOBILE*, among these are the Paterson, which is unchanged from its original announcement, the Glide, the Dort, Farmack and the Sun.

Champion Has Unique Tire Pump

Offering the most unusual feature of any car at the show is the new Champion, a small four which has an arrangement designed to pump the tires while the car is under way on the road. This arrangement consists of a diaphragm type of pump, mounted on the motor and driven from the front-end timing drive. From the pump air is carried to a distributing box on the dash, and thence to each of the four wheels. The air is led through metallic hose and the connection to the tire is through a stationary collar on each. The collar is fitted with hydraulic packing between the stationary portion and a rotating drum upon the wheel. A metal hose from the rotating drum to the tire valve completes the connection.

The distributing valve on the dash is so arranged that any one or any two tires may be inflated. It also is fitted with an automatic blow-off valve which whistles when the pressure reaches a designed amount, and prevents any more air being forced into the tire. The pump is thrown into operation by pulling a lever on the dash.

So far as the car itself is concerned it is a conventional small four, having a $3\frac{1}{2}$ by $4\frac{1}{4}$ in. block engine as a part of

the unit power plant, a single plate clutch and three-speed gearset completing this unit. Carburetion is provided by a Schebler instrument and ignition by a Dixie magneto. A two-unit starting and lighting system is supplied, the drive is of the Hotchkiss type through cantilever rear springs and a floating rear axle. The axle is a Peru make and the motor is a G. B. & S. build. Roadster and five-passenger touring cars are offered at \$750, the wheelbase being 110 in., and tires are 32 by $3\frac{1}{2}$. The car is the product of the Champion Auto Equipment Co., whose factory is at Wabash, Ind. Present plans are for the production of 5000 cars during the coming season. One feature of the car is the fact that the tires are manufactured by this concern. They are called Perfection tires and use an asbestos fabric instead of the conventional cotton fabric.

Brief Details of Other New Cars

The Sun is a production of the Sun Motor Car Co., Buffalo, N. Y., and is a new light six with the popular 3 by 5 -in. cylinder dimensions. It has Remy electric equipment, a dry-plate clutch, and Hotchkiss drive. Fuel is fed by the vacuum system, and the wheelbase is 116 in.

The Elcar is a conventional type of four-cylinder car with a five-passenger roadster body, selling at \$775. It is made by the Elcar Carriage & Motor Car Co., Elkhart, Ind. It has a $3\frac{1}{2}$ by 5 , four-cylinder motor in which the intake valves are in the head with the exhaust valves on the side. The gearbox is in unit with the motor and the Gemco axle is employed.

The Paterson is a six-cylinder appearing in five- and seven-passenger bodies, selling at \$985 in five-passenger form. The parts are standard, being a Continental motor, Warner gearset, and a Weston-Mott axle. The wheelbase is 117 in. and the tires 32 by 4 .

The Farmack likewise has been described previously. This is a four, selling at \$865, in five-passenger touring or roadster form. The $3\frac{1}{2}$ by 5 in. motor is distinctive in that it uses an overhead camshaft as well as overhead valves. The Elgin is a six at \$845 as a five-passenger touring car or a Clover leaf roadster. The Falls motor is 3 by $4\frac{1}{4}$ in. block cast, the wheelbase is 114 in. and the tires 32 by $3\frac{1}{4}$.

The Dort is a four, using a $3\frac{1}{4}$ by 5 in. block motor, unit power plant, cone clutch, cantilever rear springs. It lists at \$650 as a touring car and \$540 as a roadster. The electrical equipment is Westinghouse.

The Glide is a six at \$1,095, with a demountable sedan top at \$200 additional. It uses a 3 by 5 -in. block Rutenber motor, Westinghouse electrical equipment, and Hotchkiss drive.

A new model of the Halladay has been produced within the past few weeks. This is a small six less in size and price than the model R which was the single model scheduled previous to the first of the year. The motor is practically the same as the 3 by 5 in. Rutenber employed in the larger model, but the wheelbase is less, being 118 instead of 122 in., and tires are 33 by 4 instead of 34 by 4 . In general design the new model is the same as the model R, employing Stewart vacuum fuel feed and a Stromberg carburetor, floating axles, pump cooling, and so on. This is made by the Barley Mfg. Co., Streator, Ill.

The Detroiter has produced a new six, which is known as the 6-45 and has a six-cylinder Continental-Detroiter motor

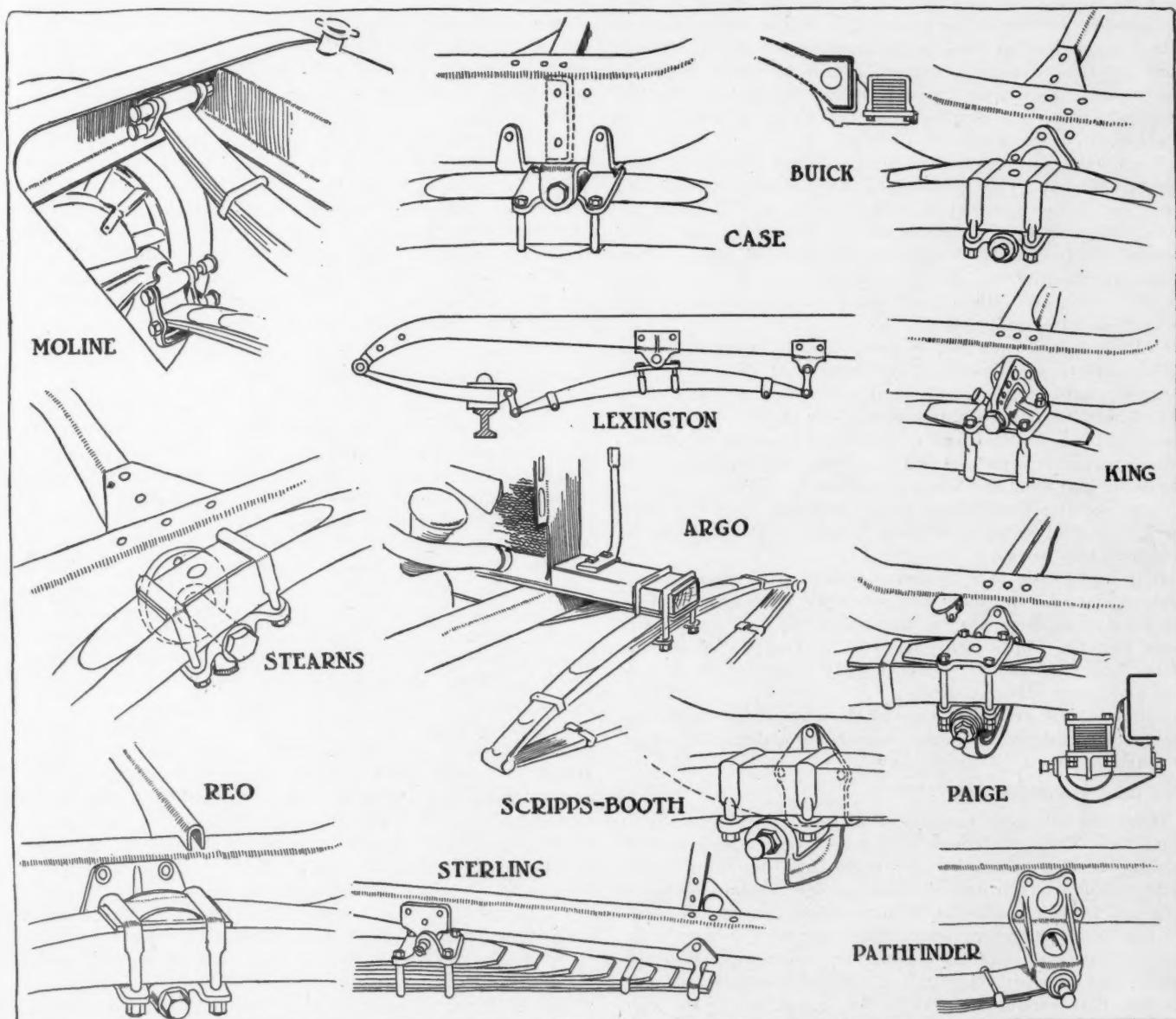
of $3\frac{1}{4}$ by $4\frac{1}{2}$ in. dimensions. It sells at \$1,098, with a very modern double-cowl touring body. A long, sloping hood, slanted windshield, hooded radiator and other features of up-to-dateness are incorporated. Some of the major specifications are: wheelbase, 118 in.; tires, 33 by 4; 18-gal. gasoline tank feeding through a Stewart vacuum-gravity system; Auto-Lite, two-unit cranking and lighting system; Hotchkiss drive through semi-elliptic underslung rear springs; and floating, ball-bearing axle. In addition to a very full list of stock equipment, special equipment is offered in tonneau windshield, Moto-Meter, and wire wheels.

There has been a slight change in the size of the Monitor six since it was announced earlier in the winter. This consists in the increase of the bore of the motor $\frac{1}{4}$ -in., so that it now is $3\frac{1}{4}$ in. The stroke remains at 5 in. This six of the Cummins-Monitor Co., Columbus, O., is known as the model N and sells at \$895 as a five-passenger tourist. A roadster is offered on this chassis and there also is a four-cylinder

model Monitor, known as the model R, which sells at \$795.

The Gadabout is one of the very smallest of the cars on exhibition, and it also is one of the lowest in price, listing at \$385 without electric lighting and cranking, or \$485 with such additional fitting as electric equipment speedometer, clock and work light. It is made by the Gadabout Corp., Detroit, Mich.

Points made in favor of the Gadabout are the low weight, economy of first cost and operation and ease of handling and the mechanical design is carried out on these ideas. The motor is a Sterling four, $2\frac{1}{2}$ by 4 in., with Atwater Kent ignition. The axle is a semi-floating type with gearless differential. An open, leather-faced cone clutch is used and the service brake is interconnected with the clutch pedal, the emergency brake being operated by a second pedal. The wheelbase is 104 in. and the tires are 28 by 3 in. The stock body is a two-passenger, though three-passenger bodies are made to order. An option of wire wheels is offered.



FEW parts of detail automobile construction vary more than the spring mountings, and the above sketches, made from cars at the Chicago show, illustrate these variations. Some engineers think it necessary to brace a frame very strongly by a cross rail at the point where the spring bracket is attached while others make no such provision. There is a

slightly growing trend towards the use of a very wide frame so that the rear springs may go beneath it instead of to one side. Cantilever springs may have the middle pivot pin either above or below the spring, the two methods being used about equally. The eight cantilever sketches show all typical mountings of both varieties.

Accessory Section Features Component Parts

Motors, Axles, Transmission Parts and Springs Better Displayed at Chicago than in New York

CHICAGO, Jan. 22—Each of the two big automobile shows invariably claims a number of accessory and parts makers that the other does not list among those present. Some of these with a more specialized distribution of their product figure that either one or the other show best meets their field, and do not go into the one which they believe does not help them materially. There are still others which are somewhat local to the show in which they exhibit, such as, for instance, a concern in Chicago that might be the western distributor for a product. Instead of the factory, which we will assume is in the East, exhibiting, this representative takes care of Chicago.

Thus when we come to the Chicago show we find that there are this year about forty names in the accessory division that were not to be found at New York, although some of the faces that were to be found on the upper floors of the Grand Central Palace in the Metropolis are missing here. These range anywhere from the miscellaneous accessory exhibitor to the maker of castings, and heavy component parts such as motors, axles and gearsets.

Chicago has always been recognized as a great rendezvous for dealers from all parts of the country at show time, and this may have some bearing on the fact that so many chose the Windy City in preference to New York. Chicago is more centrally located and is easier to reach from all sections, and so here you will find men from the Far West, from the South and from the North as well as the East. Accessory makers seeking distribution points are therefore especially alert to the advantages of being housed in the show buildings here this week.

It is interesting to note some of the big accessory names that are here for the show, and which did not appear at New York. Among them are the Remy Electric Co., the Warner Gear Co., the Continental Motor Mfg. Co., the Waukesha Motor Co., the Tuthill Spring Co., the Hess Spring & Axle Co., and many others.

Following are presented some of the accessories which visitors at the eastern exhibition were not privileged to see on display.

Two Good Motor Exhibits

There are two good exhibits of motors which were absent from New York. Although it is not exactly a new engine, having been in production for some time, the Continental little six known as model 7W, made by the Continental Motor Mfg. Co., Detroit, makes its premier appearance at any show. It is a clean-cut design with dimensions of $3\frac{1}{4}$ by $4\frac{1}{2}$ in. The displacement is 223.95 cu. in., and in general the engine follows out recognized Continental six-cylinder practice with the cylinders and upper part of the crankcase in one piece and the head detachable. The valves are on the right, and of course completely housed in. On this side are also the centrifugal water pump and provision for either generator or magneto drive on the extension of the pump shaft. On the left rear side are bosses intended for the attachment of an electric starting motor to drive through gearing with the flywheel, and this unit together with the carburetor, which bolts directly to the cylinder block, are the only accessories

on the left, although the breather and oil gage have been placed here in convenient positions.

The front of the motor is arranged to be hung from a forged cross piece, and the rear supports are a part of the housing of the flywheel, the crankcase bolting to this housing direct.

Another motor exhibit was that of the Waukesha Motor Co., Waukesha, Wis., who have several models of truck and tractor motors including a $3\frac{1}{2}$ by $5\frac{1}{4}$ in. four of very compact design, a 4 by $5\frac{1}{4}$ in. four type with cylinders in pairs, a $4\frac{1}{4}$ by $5\frac{1}{4}$ in., a $4\frac{1}{2}$ by $6\frac{1}{4}$ in., and a $4\frac{3}{4}$ by $6\frac{1}{4}$ in., these all being fours similar in design and adapted to certain truck requirements. The $3\frac{1}{2}$ by $5\frac{1}{4}$ in. type is a good example of modern truck design, and is especially recommended for commercial cars ranging from 1 to $1\frac{1}{2}$ ton capacity. It is a block-cast type with cylinders and upper crankcase a unit and the head detachable. Practically complete enclosure of all parts is a feature. Valves are on the right and the carburetor on the left, bolting direct to the cylinders, so that the distribution to the cylinders is through cored passages within the casting.

Several Component Exhibits

Apart from motors, there were a few other component parts well displayed, among them being sundry Warner products made by the Warner Gear Co., Muncie, Ind. A novelty among them is a new two-pinion differential designed especially for lighter types of cars. Instead of the usual four differential pinions, this gets along very nicely with two, and thus simplifies the construction as well as making it lighter. The Warner company also manufactures a line of steering gears designed to meet the requirements of different types and weights of cars. Model S 37 F is particularly adapted to many of the lighter types of cars on the market, and possesses the features of adjustability of rake, full worm wheel, quadrant above the steering wheel, and horn button in the center.

Another of the Warner products is a complete series of gearsets to meet any requirements. These are made adaptable to unit power plant constructions, cars in which the gearbox is located amidships, and types in which it is coupled up to the rear axle. A new example of the latter form is the model T 43, which is a very compact three-speed construction intended for cars from 20 to 25 N. A. C. C. horsepower. Similar to this but designed to bolt to the motor is the model T 46 intended for cars ranging from 20 to 30 hp. Warner also specializes in both multiple-disk and cone-clutch construction, particularly where they are intended for unit power plant installation.

Tuthill springs made by the Tuthill Spring Co., Chicago, are well displayed and in the construction of these springs the main feature of design is the absence of a center bolt to keep the spring leaves in position. Instead a bump is given the leaves and between the bottom leaf and the spring pad of the axle a wedge shaped plate is interposed; thus the combination with the spring bolts at either side of the bump prevent any movement of the wheels with respect to each other, and make a strong construction to relieve them

from any possibility of center bolts shearing or weakening of the spring leaves due to drilling for such bolts. The Tuthill company has published a booklet listing all standard makes of cars and indicating the style and model of its springs adapted to each model of each make of car. For instance, for the model D 44 Buick, the price is \$8.25.

Hess Has Axle Exhibit

Hess axle products are advantageously displayed at the show. These are made by the Hess Spring & Axle Co., Cincinnati, Ohio, and include designs incorporating both the spiral bevel gearing and straight bevels. They all have pressed steel housings, most of them ridged outwardly by webs in the top and bottom of the housing. A good example is the model 214, which is intended for the car weighing from 2800 to 3600 lb. It has spiral gears and the differential is arranged for convenient adjustment to the large opening at the rear. With these axles double-internal expanding cam-brakes are used, with the brake operating rods and equalizers incorporated in the unit.

Front axles of various sizes and shapes are also manufactured as well as any design of spring. The front axles are all of the I-beam drop-forged type, while the rear designs are made either in semi-floating, three-quarter, or floating construction, and are equipped with both ball and roller bearings.

A somewhat unusual exhibit is that of the Advance Felt & Cutting Co., Chicago, who make a big line of felt products for the use of motor cars, besides marketing a machine for the use of dealers and jobbers which cuts felt washers to the proper size for any car. It consists essentially of a regular hand-punched press and comes complete with a full set of dies, being adaptable to cutting leather, rubber or asbestos as well.

Die Castings Displayed

Die cast parts of all descriptions, some of them being exceedingly complicated, are displayed by the S. H. Franklin Mfg. Co., Syracuse, N. Y. This concern concludes that die castings are no longer an unknown quantity, now taking their place with stampings, screw machine parts, forgings and so forth in the construction of many well known instruments. The Franklin concern makes them of various white metal alloys which are forced into steel molds under pressure. The work is so accurate, a finished article results which eliminates practically all machine work. One of the specialties in this line is die-cast bearings, which present an entirely finished appearance without any subsequent machining.

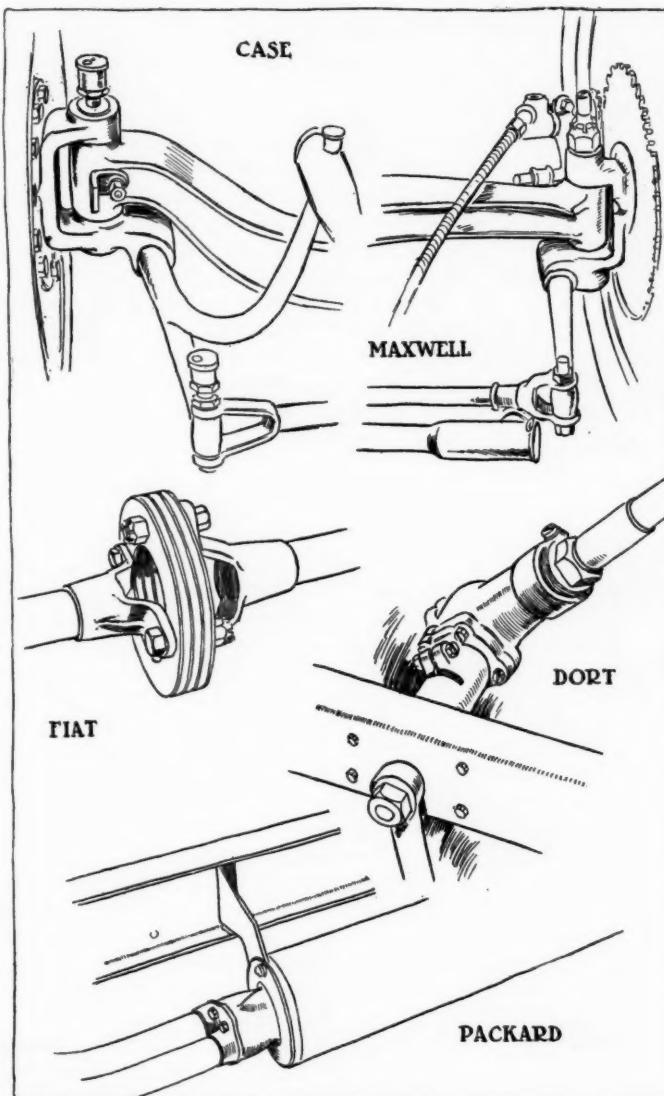
A large variety of automobile castings are to be found in the educational exhibit of the William Cramp & Sons, Ship & Engine Building Co., Philadelphia, Pa. These range anywhere from bearings made from Carson's white brass or Cramp special bearing bronze, to crankcases, rear axle worm driving gears and steering gears.

The Benjamin Electric Mfg. Co., Chicago, is featuring among other electric specialties a line of horns, both of the vibrator type, and of motor driven construction. The vibrator horns have been on the market for several seasons and the motor-driven horn is new this year. The motor operates on five to six dry cells and the principle is that of a rotating member striking the diaphragm to make an especially loud warning. This horn is made either for mounting outside or under the hood, and sells for \$7.50, finished in all black enamel and 50 cents more when it is black and nickel.

The vibrator types are in several shapes for both under hood and outside attachments and range in price from \$4 to \$6, depending on the size and finish. In their construction the vibrating electromagnets strike the diaphragm to make the signal. A magnetic horn designed for Fords is also produced, intended for installation so that it can utilize some of the excess current furnished by the Ford magneto. It costs \$3.

The American Bronze Co., Berwyn, Pa., is showing various examples of its bearing materials and castings made from Non-Gran bronze. The special feature of Non-Gran aside from the composition of the material is that it is sold in assortments of different sizes of bars to meet the requirements of the garage.

The F. A. Ames Co., Owensboro, Ky., have some new detachable tops for Ford roadsters and touring cars. These are of the cloth material construction, arranged so that the doors not only hinge nicely but the attachment of the body is very rigid and there is a good fit between body and top and windshield, preventing any air or water from leaking in. The roadster type weighs about 100 lb. net and sells for \$60, while the touring car type weighs 150 lb., and sells for \$97.50.



THESE few sketches of cars at the Chicago show illustrate some neat points of design. Two examples of the European form of front axle with the yoke on the wheel spindle instead of on the I-beam are the Case and the Maxwell. Besides being simple these are both extremely strong designs. A novel universal coupling is used on the Fiat between the clutch and the amidships gearbox, this combining both leather and thin spring steel. Each piece of leather is separated from the next by a steel lamination, so adding to the rigidity of the coupling. The Dort has a steering gear that can be set for rake when assembling the car by means of a simple split housing with a pinch screw lock. On the Packard twin-six there is a single muffler, and a very neat and simple piece is used on the muffler end to receive the two pipes.

Italy Developing Aeroplane Engines

New Model Cars Also Being Built—
Experimental Work Unaf-
fected By War*

By W. F. Bradley

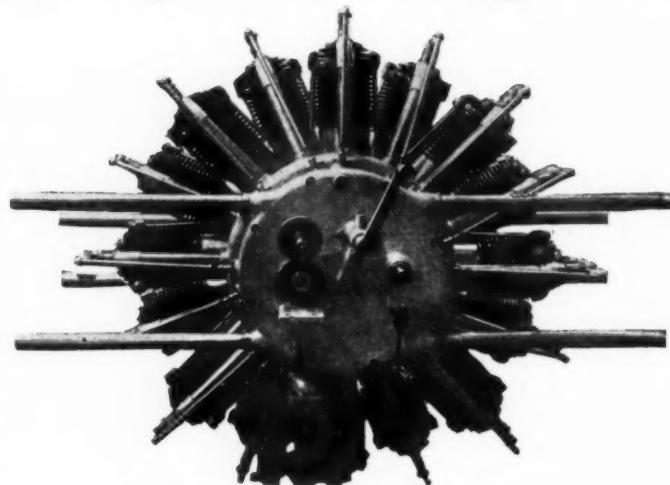
ALTHOUGH the tendency is to decrease the time spent on road tests by more complete dynamometer tests, manufacturers being pushed by the special chassis test tax, it would be impossible to convince a Turin automobile engineer that road tests are unnecessary. He would point to the mountains surrounding his town, the tops of which are capped with snow in the month of August, to the Mt. Cenis pass, more than 10,000 ft. high, he would remind you that the Stelvio, the highest mountain road in the world, is only a few hours run from Turin, and he would smile at the idea of any indoor test replacing this natural testing ground. In addition to the ordinary factory test service, the English branch of the Fiat Company maintains its own tester at the Turin factory, who must test every chassis on the road before it is shipped abroad.

Milan Has Several Factories

Apart from Turin, the only Italian town having automobile interest is Milan, where there are about 5000 people directly employed in the automobile industry. The most important factories are Bianchi and Isotta-Fraschini. Smaller firms are Zust, Otav, Junior and Alfa, this last mentioned being the old Darracq concern, but having now no connection with the French and English Darracq companies. Alexander Darracq, the founder of the Darracq Company, but now totally disconnected with that concern, is in Milan running a couple of ammunition factories supplying the Italian government. The Bianchi establishment is particularly interesting and complete. The output comprises bicycles, most of which are absorbed by the army, motorbicycles, light cars, trucks and armored cars.

Each of the European countries has its own "school" of automobile design as distinctive as the art schools of the different nations. A typical Italian car, for instance, with all nameplates removed, could not be confused with a typical French, English, Belgian or German machine. The standard Italian machine is a four-cylinder of 100 by 140 mm. (3.9 by 5.5 in.) bore and stroke. Sixes, eights and twelves may be considered as non-existent, at any rate at the present moment. Cylinders are a block casting with all external piping abolished. The biggest Fiat ever built—7.48 by 10.5 in. bore and stroke—is as clean a block casting as the smallest standard motor made. There are no detachable cylinder heads; indeed the tendency is to make the water header on the top of the cylinders an integral part of the casting. This is done by Scat and also by Newton, an English firm with an Italian factory. It is admitted that the casting is more difficult, but the advantages claimed are a neater looking job and the abolition of a joint.

In most cases the exhaust manifold is cast integrally, a conspicuous example being the Nazzaro. L-head is standard, naturally with enclosed valve stems. Intake manifold is an integral part of the casting. In many cases the throttle and



Chivibirri 16 Fixed Cylinder Aviation Motor

the jets are within the casting, only the float chamber being external. Water pumps are also combined in the cylinder casting, a good example being the Spa. Thermo-syphon cooling is not used. The crankcase breather is cast in the cylinders to avoid an external pipe. Lubrication is forced feed to all bearings with no external pipes other than the lead to pressure indicator.

Unit construction is generally employed, the motor being mounted direct to frame members, without a sub-frame and without a mud-pan. Gearbox is aluminum casting with arms encircling and forming a well for the clutch, generally multiple disk type; cone clutches are not in use. Four speeds are invariably employed. Hotchkiss drive is not used, the typical Italian car having one-piece axle housing and torque tube with forked end. This is a two-piece stamping bolted or welded together. Axles are full floating; wheels are detachable but not of any definite type—wood, wire spoke, steel spoked and steel disk all being used. Springs, semi-elliptic; brakes, water-cooled when cars are for Italian service; dashboard invariably of cast aluminum. Electric lighting and starting very commonly employed, the two-unit system being preferred.

New Models Are Being Produced

The war having had no adverse influence on the experimental departments of Italian factories, new models have been produced and tendencies are observable. There is not going to be any serious breakaway from the four, but one very important firm has a twin six almost ready and will put it on the market in 1916. It is more than probable that other firms having carried out experiments with twin-six aviation motors will also produce twelve cylinders as a model de luxe. Bore will be rather less than 3 in., and stroke about 5 in. The feeling is that the mass of motorists will be satisfied with fours and that the twin-six can only be considered as a super-fine car. There are no indications of the appearance of eight-cylinder motors in Italy.

A more general move is toward the adoption of small, light two- and four-seater cars, to be put on the market at a popular price, fully equipped with electric lighting and starting. This is an adoption of American ideas, but emphasis is laid on the fact that the cars will have the high-grade finish which always has characterized Italian cars. Bianchi has led in this direction with a small four-cylinder model of 2.4 by 4.3 in. bore and stroke. The car is really a reduction of the bigger models made by this firm, with three instead of four

*This is the last of a series of articles by the Paris correspondent of The Automobile, who has just concluded a careful examination of the Italian industry.

speeds, the gearbox being on the front end of the torque tube. The car is sold as a two- and a four-seater, with electric lighting and starting. As a two-seater it has been very extensively adopted by the Italian army, officers making use of it as a runabout.

Another important Italian firm has two new small car models ready and will doubtless put them on the market early in 1916. These are important, both on account of the standing of the concern and the changes in design which have been adopted. The two models have respectively four-cylinder motors of 2.44 by 3.9 and 2.75 by 5.1 in. bore and stroke. In each case cylinders and crankcase are one casting, but cylinder heads are not detachable; base chamber is an aluminum casting. Motor is L-head type, with enclosed valve stems, adjustable single-chain drive for camshaft and magneto shaft, and thermo-syphon cooling.

Thermo Syphon Cooling Grows

The change from pump to thermo-syphon is important, for it is likely that it will be extended to a larger model of 3.3 by 5.9 in. bore and stroke, and its sponsors are a firm always maintaining that a pump was an essential part of a motor equipment. It is admitted that it is a difficult task to produce a thermo-syphon cooled motor which will be satisfactory in the hot plains of Italy and on the Alpine passes, but the firm claims that with careful design and such good foundry work as they can produce in Italy the pump can be abolished. The change has evoked a lot of discussion and an important bet has been made that no standard car, of any make or any horsepower, with thermo-syphon cooled motor, can get over the Stelvio pass, in the Alps, under its own power. The bet has been taken up by the maker of this car and will be decided during the hot weather next year.

These two new cars have unit construction, four speeds, bevel gear drive and double internal brakes on rear wheels; there is no brake on the mechanism. Electric lighting is fitted for both cars, the larger of the two having electric starter. The generator is mounted over the flywheel housing and partly projects through the aluminum dash, the projecting end being covered by a detachable plate. The starting unit is alongside the motor, just below the crankcase hanger, and engages with a gear cut in the face of the flywheel. The smaller model has a lever starter, with rack and pinion in the gearbox. This type of starter is already in use on the Newton 2.7 by 5.5 in. four-cylinder light car and is very successful. There is no additional external mechanism, for the change speed lever is made use of, with an additional notch on the change speed quadrant, and the vertical rack is mounted in one corner of the gearbox. Only a quarter turn of the motor is obtained at each stroke of the lever, but owing to the ratio between the rack and the pinion on the lay shaft, the motor is turned over at a much higher speed than it is possible to spin it by hand.

The general specification of these cars is practically that of some of the popular American cars. The differences are in the use of a smaller high-speed motor and a better finish—sand blasted castings, polished aluminum dash, burnished bolts, parts machined all over. This adoption of American ideas is not likely to be confined to one or two Italian firms. Some leading members of the industry in Europe are in favor of closely copying the cheaper American cars, with no more finish than is usually given the \$500 car. On these lines it is claimed that they could manufacture and sell cheaper than American cars could be

imported. Others, as in the case described above, are willing to adopt the general idea, but refuse to sacrifice the detail finish they have been accustomed to give their high grade cars.

Apart from the small car and the twin-six motors, tendencies are toward detail refinements. Pointed radiators are coming more into use, with the top rounded off so as to harmonize better with the hood. Lancia is now making use of a wood fan made by an aeroplane propeller specialist; it is claimed that a propeller of this type is much more efficient than the average cast aluminum fan.

A greater use than ever is being made of aluminum dashboards, but the latest type is a hollow dash within which all the instruments and wires are carried, leaving both faces perfectly neat. With the general adoption of electric lighting and starting sets the wiring of a car is increased, and an untidy appearance is given to what would otherwise be a perfectly clean-line chassis.

Nazzaro has a very fine example of the hollow aluminum dash with all wiring encased, the only uncovered parts being about an inch of the end of each ignition wire as it connects up to the plug. The Italians have held back on chain drive, but are now coming to it more strongly, the most popular type being a triangular drive across crankshaft, camshaft and magneto shaft, the adjustment being on the magneto pinion.

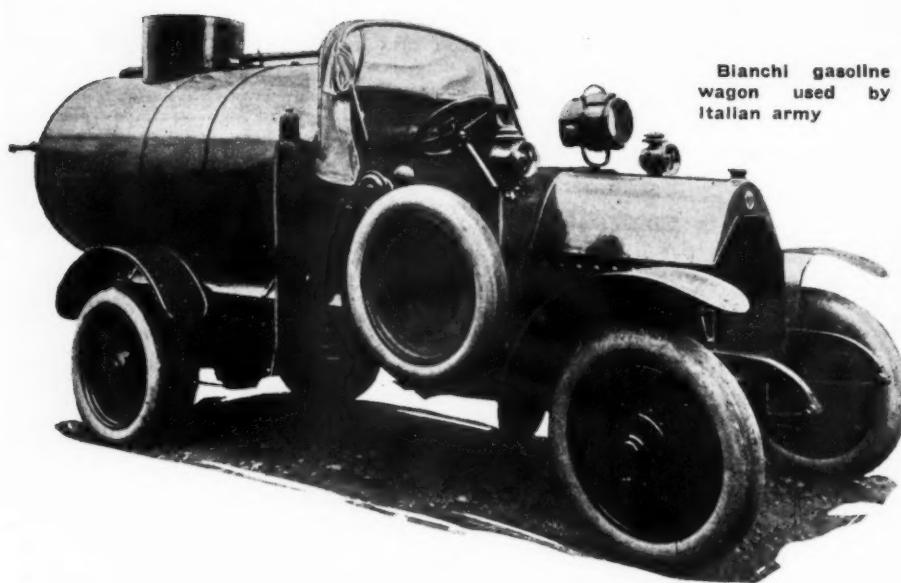
There are no worm driven cars in Italy, practically every maker having straight bevel. Fiat has recently taken up the Gleason spiral bevel gear and appears to be thoroughly satisfied with it; it is understood that this type of gear will be used for all their pleasure cars.

Few Aluminum Pistons

There is comparatively little use of aluminum pistons by Italian makers. Yet the Italian industry is not at all a stranger to this metal. Aquila-Italiana started using aluminum alloy pistons on all their cars as far back as 1911. They were used on all models up to 3½-in. bore, with hollow connecting-rods having walls only 0.85 mm. thick. Aquila-Italiana has adhered to aluminum pistons up to the present. Fiat has carried out a lot of experimental work with aluminum alloy pistons and is at present making use of them on all their six-cylinder aviation motors, which have a bore of 4.7 in., and on all racing motors. Aluminum alloy pistons were used in the set of Fiat cars run in the last French Grand Prix, when no trouble whatever developed with the pistons. At the Chiribiri factory, one of the small Italian firms doing much experimental work, I was shown a 40-hp. aviation motor with aluminum cylinders and cast-iron liners, built in

Italian Bersaglieri on Bianchi Truck





1912, and flown in that year. This firm makes aviation engines and an original light car with cylinder dimensions 2.5 by 3.8 in. bore and stroke, the pistons of which are aluminum alloy. In other factories it was stated that experiments had been carried out with steel, cast iron and aluminum alloy pistons, with the final retention of cast iron. In several cases it was stated that it had been impossible to overcome piston slap, even with a scraper ring fitted. As the result of these experiments one firm grinds its cast-iron pistons slightly oval. The head is cylindrical, the ovalization increasing as the skirt is reached.

Aeroplane Motors in Demand

Italian factories have only been interested in aviation motors since the war broke out. Previous to hostilities there was no encouragement to make aviation motors; supplies

were allowed to come in from France, Gnome securing the greater portion of the business. At the present time the Gnome Company has an important factory in Turin and is working exclusively for the government on rotary cylinder and fixed eight-cylinder all-aluminum water-cooled motors. All the factories, however, are now making aeroplane engines and a number of V-types are being produced. Fiat is at present interested in the six-cylinder vertical water-cooled type, with inclined overhead valves and a single overhead camshaft. Cylinders are of steel, and of course separate, with a sheet steel waterjacket, common to each pair of cylinders. This motor is of the same general type as that built in France by Renault and Lorraine-Dietrich.

Lancia is building twin sixes with horizontal valves, giving a combustion chamber of the type used for a number of years on Delage racers, and on the car which won at Indianapolis in 1914. Spa has built eight-cylinder V-motors, eight horizontal opposed with two crankshafts and only four combustion chambers, 10 cylinder Anzani motors, and six-cylinder vertical type with steel cylinders, sheet metal jackets and overhead valves. The Diatto Co. has taken up the Bugatti aviation motor, which has six separate steel cylinders welded together and surrounded by a copper water jacket. There are four vertical valves per cylinder, with a patented mechanism by which a single cam operates direct on a pair of valves. Isotta-Fraschini is interested in both six- and eight-cylinder aviation motors of the vertical water-cooled type. Nazzaro is building Anzani type motors. As in France, the aviation motor work will tend to bring the twin six motor into greater prominence and it is expected this will cause its adoption for car work.

Cars For Egypt Must Have Special Carbureters

ACCORDING to articles published in the Egyptian *Gazette*, the climate is an important factor to be taken into consideration in connection with the market for automobiles in that country, carburetion, lubrication and cooling being affected by the atmospheric conditions. Facilities for long distance touring being lacking in Egypt, the type of vehicle most in demand is that best suited for town traffic work.

Higher mileage per gallon of fuel may be obtained than in other countries due to the higher temperature and greater humidity, the latter condition frequently receiving inadequate attention in determining carburetor adjustments. It has been noted that in a large percentage of the cars imported it has been necessary to cut down the fuel supply to a considerable extent before satisfactory working results were obtainable, marked economy accompanying this change. This weakening of the mixture, however, frequently causes trouble with radiation due to the same climatic conditions which make the carburetor adjustment necessary.

The essentials of a perfect carburetor for use in Egypt are: It must deliver a fairly rich mixture with the control lever set at the nearly shut position to insure easy starting; the strength of the mixture should be maintained during the process of getting under way and as this progresses, gradually weakens, until the weakest possible mixture on which the engine will pull well at 20 to 25 m.p.h. is being delivered, at which point the control lever and throttle should be about half through their distance of travel. It is stated that it is impossible to secure these results from the original carburetor

owing to the use of automatic control of the air supply which prevents attaining the exact conditions required. Mechanical control of the air supply in proportion to the fuel supply is therefore necessary.

Since engine temperatures in Egypt are far higher than in the countries where the principal motor oils are made and tested, an oil that gives perfect results in other countries quickly becomes far too thin, with the result that abnormal quantities must be used and even then such thin oil does not coat the cylinder walls sufficiently to give perfect compression. Hence it gets past the rings and is burned, giving an unnecessary carbon deposit with resultant loss of power. The obvious remedy is to use a far heavier grade of oil and by so doing to increase compression with a corresponding increase of efficiency and economy and the considerable abatement of smoke and carbon. The same applies to gearbox and differential greases which soon become little better than oil, after a little running.

Special attention must be paid to the efficient protection of all working parts against the sandy dust which prevails. Universal joints should be carefully covered and frequently examined and an especially well-fitting undershield to the engine should be insisted upon, as should that type of spring shackle which is drilled for lubrication and fitted with a screw-down grease cup.

As regards springs the usual standard types do not seem to be a success and a very long and light suspension combined with shock absorbers seems to give the best result.

Working Out the Rolls Royce Brake

Experiments Showing Many Unexpected Effects with Different Materials Led to Adoption of Compressed Asbestos on Special Type Shoe

By Chas. J. Booth

(Engineer, *Rolls Royce, Ltd., Derby, England.*)

I RECENTLY carried out a series of comparative tests of various brake materials which I think should prove of general interest. The purpose of these tests was to obtain reliable and impartial data *re* the many fiber brake lining materials now on the market and to make a comparison between them and the older metal-to-metal types.

It may perhaps be as well to state at this point that these tests were made and this article written without the cognizance of the manufacturers of any of the materials mentioned and that personally I have no financial interest in any of these concerns; the statements I shall make are therefore quite unprejudiced and may possibly be not endorsed by the makers in their entirety, but are the results of my own experience and tests.

Cast Iron for Brakes

The old standard practice of using a brake having cast-iron liners working on steel drums, for many years reigned supreme in the motor car world as the best combination that it was possible to use, although such a brake it must be admitted has several minor drawbacks or faults. One of these is the noise emitted when the brake is applied, which varies from a low grating noise to a high pitched scream, and another being the tendency of the brake to suddenly seize instead of allowing itself to be gradually applied.

I tackled this problem very seriously some years ago and made a number of tests with varying grades of cast iron, which only seemed to prove that the best I could do was a compromise between two evils. The screaming and the seizing seemed to go together and were always associated with a hard and close grained cast iron, which, however, had excellent wearing qualities.

By using a softer iron the screeching and seizing disappeared, but so did the wearing qualities; I used numerous grades of iron till I got to a point where all tendency to seize was eliminated and the noise reduced to an almost unnoticeable low grating sound, but the iron was now so soft that the liners appeared to powder up and wear so rapidly that they could be completely worn through in a week's severe testing.

Experiments with Steel

I also tried varying the steel brake drums, comparing case-hardened drums with others not hardened, and others cooled out at various temperatures, but I got exactly similar results, that is, noise with hard drums and wear with soft ones, but the seriousness of brake drums needing replacement leaves the designer no choice but to make these as desirable as he knows how.

The policy therefore dictated by these tests was to use a liner made of a medium grade of cast iron as a compromise between rapid wear or noisy and screamy brakes.

I should also add that I found that an excessively hard liner also had a tendency to wear ineffective through taking a very high polish and becoming glazed, and it was also obvious of course, that the harder the liner the greater would be the wear taking place on the drum, which I repeat is a

serious point to be avoided as the very reason for the existence of a brake liner is of course, to have the wearing part of a brake easily and cheaply removable.

Lubricated Brakes

Seeing that the noise referred to above is simply the natural result of rubbing the rough surface of the cast iron without a lubricant, the next point that occurred to me was that if the brake were lubricated then it might be possible to use the hardest liners without the attendant disadvantage, but tests in this direction did not tend to impress me very favorably. It is well known that a little thick oil applied to a harsh brake will temporarily make the brake beautifully smooth in action and silent, but the effect almost immediately wears off if the brake is applied hard.

If on the other hand a liberal supply of oil is applied in the first place in order to last longer, one finds the brake practically useless when first applied, with perhaps, dangerous results in an emergency.

The position therefore forces us to consider brakes which are automatically lubricated; this, however, is a complication which like all other complications must in my opinion justify its existence by very definite benefits, which in my experience they do not.

One method is to use a number of oil grooves on the brake which are connected to an oil well, or sometimes to a drip feed lubricator, these each have their disadvantage, the principal one being that if the brake is not used for a lengthy period it is flooded and useless when next required, hence the designer is driven to elaborate the scheme so that the amount of oil used is controlled by the number of times the brake is used. The most usual type employed is one in which an oil-way is uncovered or a valve opened every time the brake pedal or lever is operated, thus insuring a supply of oil simultaneous with each brake application, but I have not yet myself tested a system which was free from unexpected floods of oil occasionally; for instance in negotiating congested traffic one is constantly depressing the brake pedal without actually applying the brake, and consequently the brake is swamped with oil and inefficient when it may be urgently needed.

Another serious objection to lubricated brakes is that, with prolonged application the oil is liable to be burnt entirely away and, unless the pull on the brakes is reduced proportionally (which is too much to expect a driver to do) the brake suddenly seizes.

It is a most desirable thing to have the efficiency of the brake absolutely constant, and this can be most readily obtained by using an unlubricated brake, and my own experience compels me to indorse the policy of those manufacturers who go to some trouble in their brake designs to prevent the possibility of any oil leaking or being thrown on their brake drums.

Using Phosphor Bronze

Having apparently exhausted the possibilities of cast iron, my next move was therefore to look out for some other ma-

terial that might combine in a greater measure the desirable features of efficiency, silence and durability, and phosphor bronze struck me as being possibly a suitable material. I therefore made several tests with this and similar alloys, but I was not very favorably impressed by the results, the action of this material appeared to vary, not with its hardness, but with the speed of the revolving drums; at very slow speeds for instance the efficiency of the brakes is good, but accompanied by much screaming noise, and at fast speeds the brakes are much less efficient, but are more silent: at very high speeds they were ineffective. They appear to wear well, but develop a rough surface after much use; they also roughened up the surface of the drum.

This material cannot be used successfully with a lubricated brake as the co-efficient of friction is reduced to a point which makes the brake valueless.

Copper for Liners

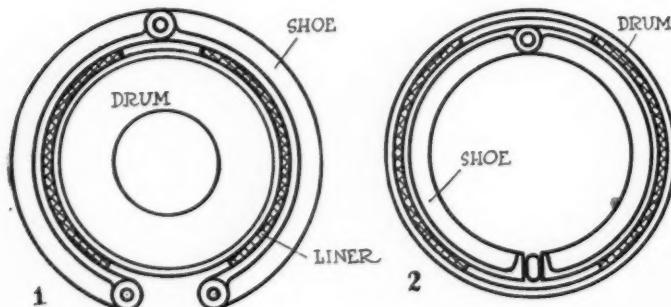
I also tried brake liners made from hard copper, these in contradistinction to phosphor bronze appear to work better when lubricated, but were rather uncertain in their action although they were very silent and smooth when oiled. Like phosphor bronze their surface appeared to roughen up after use, when used dry; in this condition they also screamed very badly and seized.

Woven Asbestos Materials

My only hope seemed to lie in trying some of the many brands of woven asbestos brake linings. I made up some brakes using liners having sections of both cast iron and asbestos, but the latter appeared to compress in use, leaving the cast iron to take all the load.

I was greatly disappointed at these results and discontinued the tests, concluding that there was nothing to better the use of cast iron brake liners, and for a time I left the subject of brakes entirely alone. Fairly recently, however, I became impressed by the very rapid rise to popularity and universal use of these asbestos fabrics and decided to give the matter further consideration.

The first thing I then discovered was that the wearing



qualities of these fabrics had been greatly improved so that they had better durability. Here then was one great objection removed, leaving only the trouble of over-heating which I previously found in my tests and which I now proposed to tackle in earnest, feeling confident that it only had to be understood to be overcome, seeing the general use to which this material is now being put not only on passenger cars such as I am interested in, but also on heavy lorries, omnibuses, street cars, electric underground railways, etc., in London and Paris.

I used exactly the same model of brakes as for my previous tests and was quickly able to confirm the excellence of the wearing qualities and also the silence and smoothness of the material in action, but the heat trouble was still there, the brake drums getting so excessively hot as to cause them to run right out of truth, and to be discolored all over.

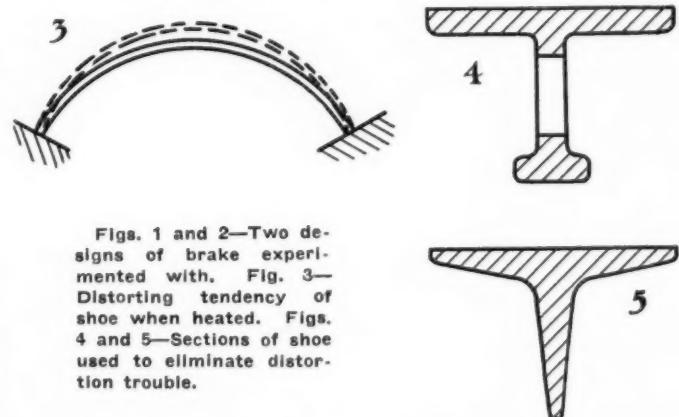
Asbestos of course is an excellent non-conductor of heat, and consequently the heat generated in the brake is concen-

trated on the drum, whereas in a metal-to-metal brake the heat is distributed to both the shoes and the drum and the temperature of the two members remains fairly constant, which will be seen later is an important point.

The brake used in my first experiments was of the external type shown diagrammatically in Fig. 1 and on considering the problem it will be seen at once that the asbestos insulates the drum, compelling it to retain all the heat generated, whereas with metal liners most of the heat is quickly dispatched through the shoes to the atmosphere, thus explaining why the drums should get so excessively hot when used with asbestos liners, and not otherwise.

I therefore began to realize that in order to be able to utilize asbestos liners to their full value, I must necessarily re-design my brakes accordingly, and this also explained to me the very contradictory accounts I had heard from various sources of the efficacy of these liners, and I saw that their success or otherwise depended entirely on the type of brake to which they are fitted. I therefore abandoned the external type of brake, as unsatisfactory for a heavy touring car unless a water cooled drum or other complication be introduced, and I consequently turned my attention to experimenting with an internal type of brake (See Fig. 2). In this type the heat is still, of course, concentrated on the drum, but the latter, being on the outside, has a better chance of cooling, and I was quickly able to demonstrate that in this case the drum did not get so hot, but the brake was by no means perfection.

The next trouble that demanded attention was the fact that the brake, although very efficient when first applied, gradually became less efficient if used continuously; one naturally followed this up by further pressure from the



Figs. 1 and 2—Two designs of brake experimented with. Fig. 3—Distorting tendency of shoe when heated. Figs. 4 and 5—Sections of shoe used to eliminate distortion trouble.

foot or hand as the case might be, until the maximum movement had been reached, whereas the brake would continue to grow less effective till it went completely off. On releasing the brake and allowing it to cool it quickly regained its former state, but would again repeat the performance if continuously applied long enough. This was exactly the reverse to the action of the other type of brake, which tended to jam on with continuous application.

This is only what we should expect after considering the two diagrams; in each case the drum expands due to heating up, and in Fig. 1 this has the effect of getting closer to the shoes whereas in Fig. 2 it expands away from them. If metal liners are used with either type this trouble does not accrue, as the heat being transmitted to the shoes, these expand with the drums.

The drums obviously required still further cooling, so I had some made with cooling ribs turned on the outside. These were a great improvement, considerably lengthening the amount of time the brakes could be kept on continuously. The added weight of these ribs is partially compensated for by enabling one to use thinner drums. It is significant how the use of these cooling ribs have come into general use,

coincident with the extensive adoption of asbestos liners.

I was however by no means out of the wood, there was still the same tendency for the drums to expand away from the shoes although it took longer to accomplish, and the reason this does not happen with metal liners is, as previously explained, that the shoes also expand and follow up the movement of the drum. I therefore endeavored to find a way of transmitting some of the heat to the shoes. This I did by using a large number of rivets and having the tops of these flush with the asbestos linings, which successfully lengthened the amount of time the brakes could be run continuously.

But yet another trouble arose; curing one trouble had created a second. I now discovered that after the shoes had been heated up they not only distorted, but they took a permanent set.

After carefully considering the matter I reasoned it out in the following way. Referring to Fig. 3, let us suppose the brake shoe be represented by a simple arc of metal, rigidly held at each end, which if it expanded through being heated up, one would expect to take the form shown by dotted lines, but, if in addition to being fixed at each end the drum also prevents any movement in the way indicated by the dotted lines, then the only way left is for the tendency to expand to take the form of compressing the lower face of the metal, tending to bulge out the bottom face.

If the brake is now released, cooling sets in and if the shoe cooled evenly all over it should re-assume its former shape, as permanent set under such circumstances can only be the result of unequal cooling; I therefore turned my attention to the section of the shoe which was the one most commonly used and shown in Fig. 4. It was then obvious to me that the bottom flange furthest away from the source of the heat, with its large surface and bulk of metal, would certainly cool very rapidly; mainly due, of course, to the tendency of the drilled out thin web to impede the flow of heat from the large flange. This bottom flange being under compression but the pressure at the extremities being relaxed, it therefore straightened out slightly, forcing the upper flange to form a larger radius and thus causing the trouble referred to above.

I therefore set about designing a shoe which would cool more evenly and consequently after several attempts I evolved a shoe having the section shown in Fig. 5. This I found minimized my troubles to negligible quantities, the only remaining fly in the ointment being a squeaking noise which came into existence simultaneously with the employment of a larger number of flush headed rivets in the liners.

I made a comparative test between iron, steel, copper and aluminum rivets and found the latter to give the least trouble from noise and I therefore adopted them.

I was able to satisfactorily accomplish what I set out to do, namely to produce a brake combining the qualities of silence, efficiency, absence of tendency to seize prematurely, long life, smoothness of action and reliability with prolonged application, and I feel sure my experiences should prove very useful to others desiring the same ends.

There will be some of course who will doubtless say that I went to a lot of needless trouble, their brakes being quite satisfactory although they ignore many of the points I have suggested as being necessary. To these I can only reply that the car I was working on was an exceedingly heavy and powerful touring model, and many of these points are not so essential on a light car. Or again, some people may be satisfied with a lower standard than I am, also many wait till a trouble loses them orders before they consider it important. I can only state that our old brakes gave satisfaction to most, it being only the most fastidious customers who ever complained to us about them, but now all our customers are loud in their praise of the excellence of our brakes, and I know that in a few cases they have proved a turning point which brought us the order.

In selecting a suitable fabric I have been very successful with a die-pressed, bonded asbestos for my heavy cars. The die-pressed variety will outlive the best cast-iron liners and it has a very high co-efficient of friction, being .32, which factor seems to remain almost constant under all normal conditions, being not appreciably affected by either pressure, speed or temperature. With a good fabric all three of these factors can be raised to higher values than are likely to be met with in actual practice, without destroying the material.

Aluminum Cylinders Without Iron Liners

IN our British contemporary *The Autocar*, of Jan. 8, there are two suggestions for using plain aluminum for cylinders without cast-iron liners by means of special piston design. The idea is as follows:

"The first idea consists in the use of an aluminum alloy cylinder with a thin steel piston. The piston has no rings on it, but special contractile rings are let into the cylinder walls, the piston being sufficiently long so that it does not uncover the rings either at the top or bottom of the stroke. These contractile rings are used in order to obviate the wear of the cylinder walls due to the scraping of the usual piston rings. The steel piston is long and has the advantage of reducing the specific pressure on the walls, besides omitting the weight of the rings and their containing grooves.

"The co-efficient of expansion of aluminum is considerably greater than that of steel, and therefore if an aluminum piston be used in a steel cylinder there is a tendency for the piston, in expanding at a quicker rate than the cylinder, to bind, this being avoided by the allowance of considerable piston clearance.

"If the procedure be reversed, however, as is suggested by Mr. Funck, the aluminum cylinder expands quicker than the steel piston, so that no great clearance is necessary, and the faster the engine runs and the hotter the cylinder gets the less is the tendency toward binding.

"So far as the wearing qualities are concerned, it seems reasonable to expect that the new arrangement will prove

satisfactory. Aluminum pistons in cast iron or steel cylinders seem to wear quite well, and in this case the smaller surface is the aluminum piston, whereas when aluminum cylinders are used the smaller surface is of steel. There is an analogy in the white metal-lined bearing in daily use which in many cases is superior to a bearing made with a harder metal.

"The second arrangement designed by Mr. Funck consists of a plain aluminum cylinder without rings, and in this case the piston is provided with a series of grooves to act on the principle of the labyrinth packing used extensively on steam turbines. Briefly, labyrinth packing consists of a series of grooves without rings, the initial pressure being reduced step by step as the medium expands successively in the various grooves, so that before the last groove is passed atmospheric pressure obtains. In a steam turbine there is, of course, no possibility of carbon forming in the grooves, and Mr. Funck claims that there would be no fear of these grooves carbonizing up an internal combustion engine arranged according to his design, as the cooling of the engine would be very effective owing to the high heat conductivity of the aluminum alloy cylinder.

"It is thought that these aluminum cylinders should be specially suitable for air-cooled engines, with the radiator fins cast on the cylinder, and if necessary machined all over. In both cases the valve seats are shown as fixed into the cylinders separately, so that cast iron may be used."

Sterling Has Simple Chassis

New \$595 Car Uses Double Expanding Brakes and Cantilever Rear Springs—Two Unit Electrical Equipment

THE Sterling, a new roadster made by the Sterling Automobile Mfg. Co., New York City, is a new entrant into the low-priced car classifications. The car is marketed under the name of Sterling-New York and although selling for \$595 fully equipped, it is thoroughly up-to-date in design and incorporates many meritorious features. Among the special points of interest about the car are the Lanchester cantilever spring suspension, ample body room and low center of gravity secured by flat spring suspension and drop frame construction.

The power plant is a unit type including a four-cylinder block motor, cone clutch and three-speed gearset. The motor dimensions are 3 by 4.25 in. giving an S. A. E. rating of 14.40 hp. The piston displacement is 120.2 in. The 1½ in. valves are in the head and are operated by rocker arms which are controlled by means of external pushrods operating from the internal camshaft. The valves are all on the left side of the motor head and the horizontal rocker arm shaft carries eight rockers, an independent one for each valve.

Carburetion is taken care of by a Zenith instrument which is carried on the right side of the motor. The intake gases flow across the top of the head of the cylinder to the valve openings which are on the opposite side of the head from the intake port. Ignition is by the Wagner battery system in which the current is furnished from the storage battery and the balance of the system is made up of the Wagner distributor mechanism and a high-tension coil. The distributor drive is from the forward end of the timing gears which provides an accessible location. The high-tension coil is mounted on the side of the motor, giving very short connections between the breaker distributor mechanism and the coil.

Splash lubrication is employed, the oil being carried in the bottom half of the crankcase.

From the motor, the drive is taken through an inverted leather-faced cone clutch to the three-speed sliding selective gearset. The housing of the flywheel and gearset has been kept light by reducing the amount of metal necessary here to a minimum. The assembly is also compact, the distance between bearings is short providing rigid shaft construction. The gear-shifter lever and the hand brake lever are mounted on an extension of the gearbox cover plate. This is done to bring the position of the levers to a convenient location for the driver. At the same time, the

rigidity of a cover plate mounting is maintained. The entire power plant is self-contained with very few external parts outside of the valve mechanism. Since the motor is water cooled, there is no water pump and the neat block casting and self-contained working parts combine to render the assembly quite clean.

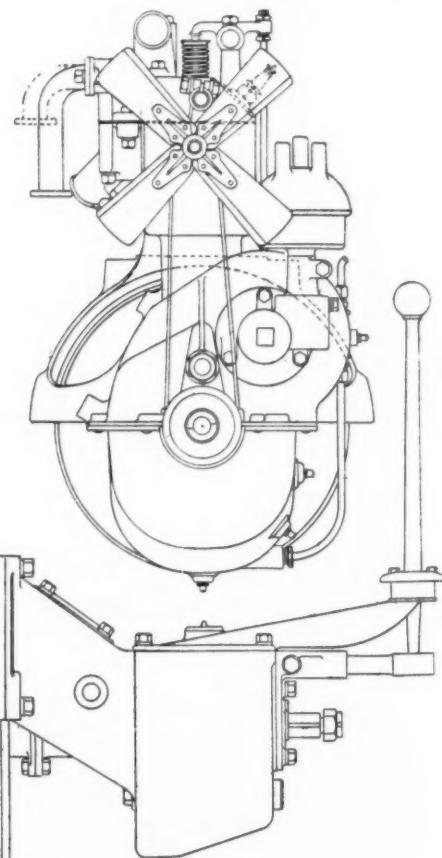
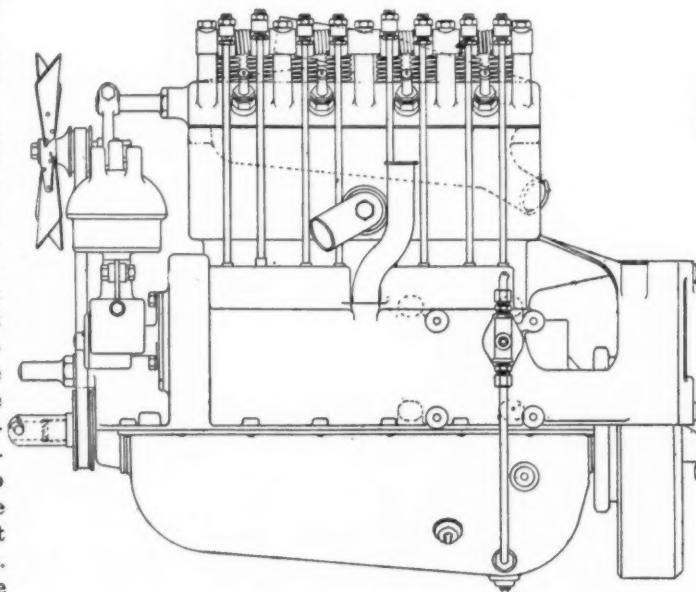
Lighting and starting are by the electric Auto-Lite system which is made up in two units, the generator is driven by silent chain and the starting motor has the Bendix gear attachment for meshing with the flywheel.

Bearing Provision Ample

Anti-friction bearings are used throughout the entire power transmission mechanism, the gearset being mounted on ball bearings and employs chrome-nickel steel gears. The semi-floating rear axle is also made up of chrome-nickel steel units carried on ball and roller bearings. The parts made of chrome-nickel steel are the bevel gears, pinion and driveshafts.

Two sets of brakes are on the rear wheels. These are lined with Raybestos. The wheels are wood-artillery type made from hickory and given a natural wood finish. They are equipped with quick-demountable rims and the standard equipment includes an extra rim. The standard tires are

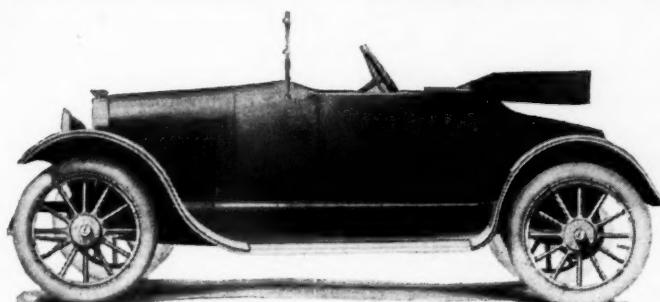
Motor used in Sterling car, showing the overhead valves and the accessibility of the distributor



30 by 3½ Swineharts. The wheelbase dimension is 102 in. In exterior appearance and equipment, the car is a straight streamline design with no perceptible break in the body line between the cowl and the bonnet. The fenders are crowned and are made of heavy-gage steel with full skirts and dust shield. The running boards are covered with linoleum.

Equipment Is Complete

The price mentioned includes full equipment which is specifically mentioned as a full set of lamps, the head-lights being 10½ in. adjustable focused type with Mazda bulbs, electric tail light with license bracket, rain vision ventilating windshield, mohair one-man top, extra rim, tire irons, tools and tire pump. The standard finish is blue, black or gray with either natural or painted wheels.



The Sterling Roadster

Economy of performance has been made a feature of the design. The car is light in weight and the construction is unified so as to maintain the number of parts at a minimum. The seating space has not been slighted and in accordance with the latest dictates in body design, the doors are large and have concealed joint lines and hinges.

Dust-proof Envelope

The top is held in a dust-proof envelope which is so arranged as to provide a firm support for the top and at the same time to conform to the lines of the body without sagging. It does not interfere with the rear deck, beneath which baggage may be carried if desired.

Low price attained by efficiency of design and by simplicity is the keynote and each detail from the ground up has been worked out to go suitably with the rest.

George Automatic Roller Bearing

Compensates for Variations in Roller Diameters

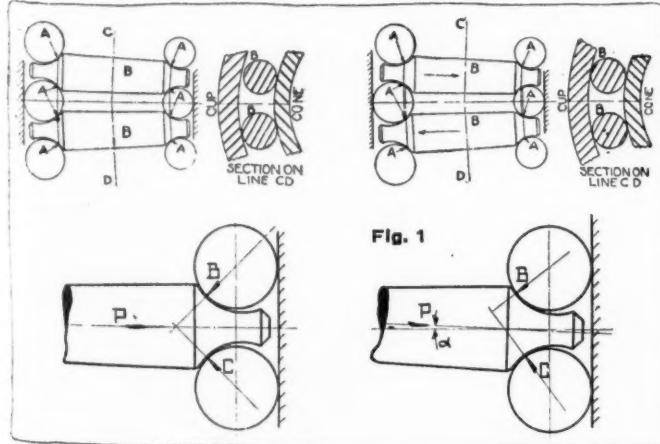
A ROLLER bearing which has been described as automatic has been placed on the market by the George Automatic Roller Bearing Co., Cincinnati, Ohio. This bearing was first shown the automobile engineers on the last summer's excursion of the Society of Automobile Engineers on the Great Lakes. It may be described roughly as a roller bearing in which the rollers are held in suspension on balls. It combines the functions of a radial and thrust bearing and has as an important feature of merit that it automatically compensates for commercial variations in actual roller diameter.

Balls Adjust Rollers

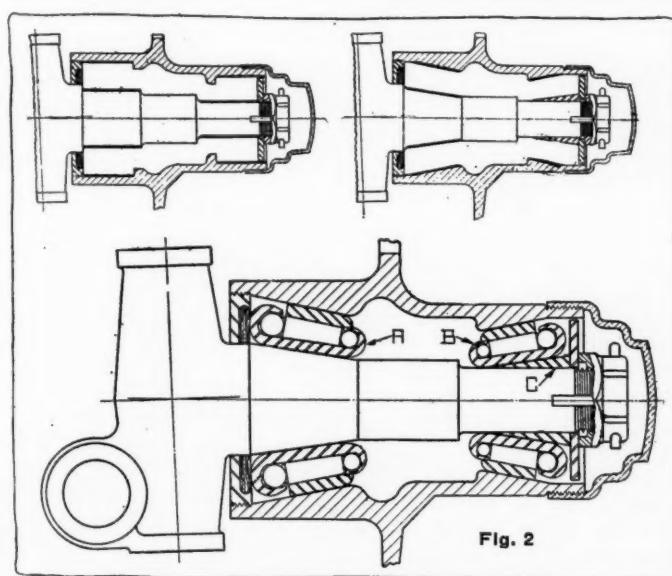
A general view of the bearing which will bring out the fundamental principles of its construction is shown in Fig. 1. By the construction of this bearing the rollers are separated by two rows of balls which, while decreasing

frictional resistance, produce an automatic adjustment for the rollers. Furthermore the construction is such that concentricity is maintained without compelling expensively close limits in machining. An ingenious method of mounting and dismounting the bearing has been provided and the entire assembly can be taken apart for inspection and cleaning without the use of tools or distortion of the parts.

Briefly, the bearing is conical; this being so the rollers are tapered to compensate for the conical race and the tapered rollers have lateral freedom controlled by the contact of the balls at A Fig. 1, on the conical ends of the rolls B. When the bearings are mounted and tightened in place there is a certain wedging action on the rollers, but as soon as the bearing has made a half turn the large rollers are forced to creep owing to the pressure upon them, thus forcing the balls in contact further apart. This pressure is equalized all around the outer and inner rings because the balls are



Diagrams and assembly sections showing the construction of the George automatic roller bearing and the action of the balls and rollers under the stress due to load. The compensating action of the balls and rollers on the conical race is the novel feature. The upper diagram on the right shows in comparative form the amount of accurate machining required on the hub with the George and with the parallel type of bearing.



pressed into their proper running positions automatically. The large and small rollers thus automatically take their places, being forced either forward or backward until the same working diameter between the cap and cone is produced all around the bearing.

Suppose one of the rollers is a trifle thick and another a trifle thin, then the thick one will receive more than its share of the load, and directly the bearing begins to turn it will slide outwards till it takes no more than the load on the others. This outward sliding, however, puts pressure on the outer ring of balls and lets it off the inner ring, so the effect of a thick roller sliding outwards is to press any small roller inwards, so effecting compensation.

All roller bearings need a separating medium for the rollers. In this particular bearing the balls at the inner and outer ends of the rollers are used as separators. This design provides rolling contact between the balls and rollers thus eliminating the frictional resistance which would come from a sliding action. Also, the conical ends of the rollers acting in conjunction with the balls form a true concentric rolling action and overcome tendency to skew out of the true rolling axis.

Referring to the lower part of Fig. 1 if there is P pounds end thrust on each roller there will be a reaction through the balls along the normal lines B and C . Owing to the shape of the end of the roller the angle made by P B must be the same as the angle made by P C . consequently the forces B and C are of the same magnitude and the axis of rotation must remain true. To the right of Fig. 1 at the lower corner is shown the alternative condition where the angles are not equal. This would provide an unbalanced force, with the result that the bearing would tend to slide away from its true rotative axis.

Simplifies Machine Work

One of the claims for the bearing is that in mounting, it is unnecessary to have great accuracy in machining. Both the

inside and outside surfaces of the bearing are taper and hence concentricity is obtained by tightening the bearing in position.

At the same time any small variation in diameter of the housing or seat in mounting is taken up by a very slight lateral movement of the whole bearing. Fig. 2 shows a typical installation of a front hub fitted for George automatic roller bearings. As will be noted, the tapered surfaces render unimportant close limits in machining for the bearing mounting.

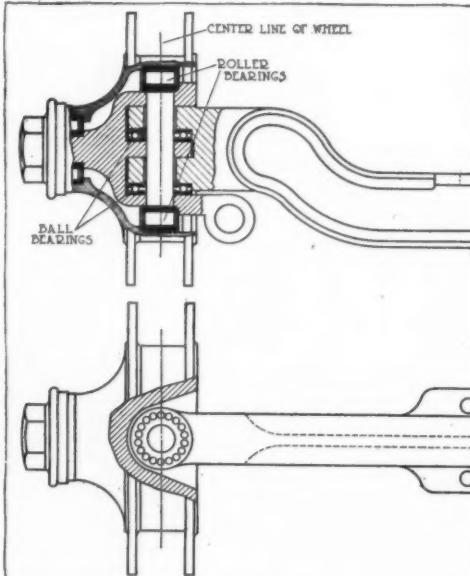
In the typical George mounting shown, the bearing A does not touch any part of the spindle until it rests on its tapered seat. The hub is then mounted by moving it laterally until it rests upon its tapered seat and bearing B is then put into position and it in turn must come to rest on its tapered seat. The split tapered collar C is then slipped over the spindle and that again must rest on its tapered seat after which, the splined washer, lock adjusting nut and cotter pin are put into position in the usual manner. The entire assembly is then concentric with the axis of rotation of the wheel and this has been accomplished without the use of special tools or any force.

In disassembling the bearing the first ball is dropped out of a little opening in the periphery of the larger race. After this is removed another ball can be dropped out and then the rollers can be pulled out by canting them sideways and lifting them from place. The other balls then drop out. The reassembling work is easily accomplished by simply reversing the procedure. There is no danger of the bearings falling apart when packed in position as it requires manual separation of the rollers to allow the first ball to drop out of the opening.

The mounting illustrated, of course, needs a special hub or housing to take the George bearing, but the manufacturers are now prepared to supply bearings with an integral outside part that will enable them to be interchanged with other bearings of the long series type.

A Design of Swivel Giving Centrally Pivoted Steering

With reference to a recent article in THE AUTOMOBILE on the layout of steering gear Elmer E. McIntyre, ball and roller bearing manufacturer, Pittsburgh, Pa., calls attention to his center swivel front axle, which provides the ideal front wheel mounting without clumsy parts. The illustrations are completely self-explanatory except for the large diameter roller bearing which surrounds the swivel. The weight is taken on two ball thrust races, and the roller wheel bearing is located centrally in the plane of the wheel which is mounted vertically instead of being dished. No road shock barring a glancing blow can deflect the steering.

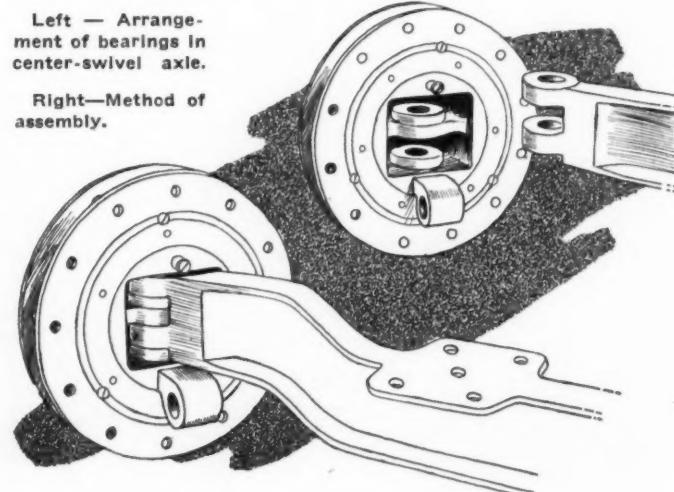


A feature of the device which is uncommon among centrally placed swivels is that it does not need an ugly or cumbersome wheel hub to accommodate it, and it has the further advantage of being reasonably inexpensive to make. It would be difficult to imagine any sort of axle end easier to forge than this.

Having due regard to its undoubtedly advantages, it would be interesting to know how many American manufacturers have actually tried out a center pivot axle. In Europe the experiments have been few and far between.

Left—Arrangement of bearings in center-swivel axle.

Right—Method of assembly.





The Rostrum

Minervas In Isle of Man Races

EDITOR THE AUTOMOBILE:—How did the three Minerva Knights perform in the Isle of Man races a year ago? How did these cars differ from the stock models?

2—Does not an Argyll single sleeve valve motor hold some records on Brooklands track? What are the differences from a stock car of this make?

3—Please publish a horsepower chart of the 1913 Stearns-Knight.

Mesa, Ariz.

—The three Minerva-Knight cars performed excellently in the Isle of Man races. They did remarkably well considering they were the first racing cars made by the Minerva company. They suffered extensively from broken connecting-rods. The motor did not in the least resemble a stock Knight motor as it had large exhaust ports at the bottom of the cylinder, the opening of which was also controlled by the sleeves. At the top of the cylinder the intake and exhaust ports were much larger than usual.

2—An Argyll sleeve motor in 1914 took the world's record for 12 to 14 hr. continuous running on the Brooklands track. This car was a stock car with a single-seated body slightly different gear ratio and special carburetor. Please note the Argyll is no longer manufactured and the single sleeve valve had nothing to do with Knight, very much on the contrary.

3—A horsepower curve of the Stearns-Knight six-cylinder 1913 motor is published in Fig. 1.

Circuit Breaker Cam is Worn

Editor THE AUTOMOBILE:—I have a Great Western four-cylinder car and for some time it has been missing on No. 1 and No. 4 cylinders and I am unable to remedy this. The plugs are all right and the compression is good. I have put new platinum points in the magneto breaker, which is a Remy, have cleaned the carbon from the cylinders, adjusted and readjusted the spark plug points. Have tried new plugs, changed them from 2 and 3 to 1 and 4; have adjusted the carburetor, but still, numbers 1 and 4 miss. Some times they miss and then again they do not. This occurs at both low and high speeds, with and without load. I have also ground the valves. Please advise me just what the trouble can be in this case.

Bastrop, La.

—The circuit breaker cam in the magneto is probably worn so that the circuits are not broken on cylinders No. 1 and 4, or the distributor gaps for these cylinders might be too wide. Leaky valves or manifold connections might also account for the missing cylinders.

Repair Business Should Be Success

Editor THE AUTOMOBILE:—Is there much profit to be made repairing automobiles?

2—What salary does the average repairman get?

3—Can one become an expert in ten weeks at an automobile school?

4—Which is the quickest and most thorough way to learn the business, in a repair shop or in a school?

Honea Path, S. C.

B. S. M.

—This seems to be largely dependent upon the methods of doing business, as there are a large number of successful concerns and also a large number who do not survive. Putting the matter on a broad basis, however, there is no reason why a properly conducted automobile repair business in a proper locality should not prosper.

2—This varies through quite a range but probably \$18 a week would be an average.

3—No.

4—A combination of both makes the ideal repairman. He should have a knowledge of the theory as well as the practice.

Installing an Ammeter on Chalmers

Editor THE AUTOMOBILE:—Kindly send me a sketch showing how to install a charging and re-charging ammeter on model 24 Chalmers; also let me know the highest reading that this ammeter will require?

New York City.

E. O. H. C.

—The method of procedure in both cases is identical and the ammeter should be cut in off the battery lead as shown in the diagram Fig. 2. The reading of the ammeter should show on charge from 0 to 25 and on discharge 0 to 150.

12-Volt Generator on 6-Volt Battery

Editor THE AUTOMOBILE:—Approximately how much and what size of fine wire would be used in making a cutout relay to work on a 6-volt generator?

2—How can a 12-volt generator be used with a 6-volt storage battery and 6-volt lamps?

3—When pistons are found to fit too loosely in cylinders and cause piston slap, can anything be done with them except fit larger pistons? Have heard they could be enlarged by heating. What is your opinion?

Manitoba, Canada.

J. S. C.

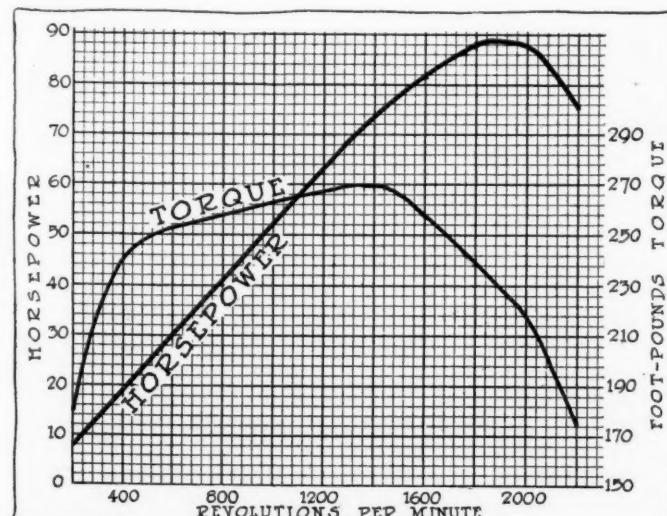


Fig. 1—Horsepower and torque curves of the Stearns-Knight six-cylinder motor of 1913

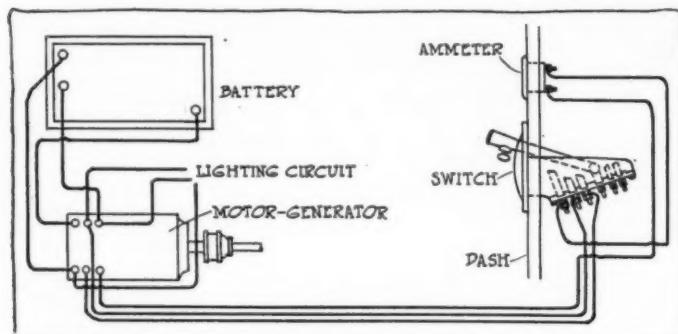


Fig. 2—Wiring diagram showing connections of ammeter on model 24 Chalmers

—The amount of wire and size will vary with the design of the cutout, but it will approximate in general the ordinary bell buzzer winding designed for that voltage.

2—It is a rather difficult proposition to use a 12-volt generator with a 6-volt battery. A 12-volt generator, if its fields are connected in series, can sometimes be changed to a 6-volt by connecting the field in parallel. The generator can also be made to develop 6 volts by cutting the speed in two. When this is done the generator, battery and lamp will work together, although the capacity of the generator will be limited to a considerable extent.

3—The only safe method is to fit larger pistons.

Finding Horsepower by Formula

Editor THE AUTOMOBILE:—Will you please tell me how to find the horsepower of automobiles?

2—What is the horsepower of a car that is $3\frac{1}{4}$ by 5 in.?
Jamestown, N. Y. K. B.

—Multiply the bore of the motor by itself, then by the number of cylinders and divide by $2\frac{1}{2}$.

Many Factors Determine Car Speed

Editor THE AUTOMOBILE:—Please give me some information regarding two Overland cars. One is a 1914 model 79 F and the other is a 1915 model 81. The 1914 has a 35 hp. motor and 4 to 1 gear ratio and the 1915 a 30 hp. motor with 4 to 1 ratio. Please give the actual speed of these two motors in miles per hour; that is when the momentum of the car is not pushing the engine. Both cars use 33 by 4 tires.

Anna, Ohio.

O. E. H.

—It is impossible to give a definite figure in speed in miles per hour for these cars, as they vary considerably with the condition of the motor, the tightness of the bearings, the atmospheric conditions, adjustment of the carburetor and many other factors. In fact, two cars taken out of stock will not make the same speed due to variations in adjustments, etc. It is impossible to give more than an approximate speed, therefore, and in each case this is about 50 m.p.h.

Using an Alcohol Hydrometer

Editor THE AUTOMOBILE:—Kindly advise me how to use an alcohol hydrometer. I wish to test the strength of the alcohol solution in the radiator of my car so I can determine whether I have a safe margin to allow for the various temperatures. I have purchased an hydrometer which is marked as follows: "U. S. C. H. Hydrometer for Spirits with Tralles Scale for Alcohol temperature 60 deg. Fahr."

New York City.

W. S. J.

—The way to use a hydrometer in order to test freezing solution is to first make the mixture in your radiator that you desire to use. A reading on the hydrometer is then taken and as the alcohol evaporates readings are taken on the

hydrometer and sufficient alcohol added to bring back the reading to the original.

Valve Spring Pressure of Racers

Editor THE AUTOMOBILE:—What is the relation of valve diameter and width of valve seat to valve spring pressure?

2—What are the valve spring pressures of the Chalmers 6-40, Mercer 22-70, Duesenberg motors, Peugeot, Mercedes or other racing cars with overhead valves and camshaft?

3—Where can I obtain some two- or three-ply wood veneer similar to that used in building bodies before metal came into use?

4—How is skin friction, or the friction caused by a body moving swiftly through the air, computed?

5—In a magazine which is no longer published, I read an article in which the author, wishing to show the importance of wind resistance, gave the following example and law, "The wind resistance of a moving body increases as the cube of its speed." He then cited that the wind resistance of a body moving 60 m.p.h. would be twenty-seven times as great as at 20 m.p.h. He obtained this by dividing 60 by 20 and cubing the resulting quotient. This computation of wind resistance and the curve of wind resistance published in THE AUTOMOBILE for Sept. 2, on page 428 do not quite agree. Will you please tell me which is correct?

Akron, Ohio.

R. T. O'B.

—The relation between valve diameter to valve spring tension is simply empirical. There is no definite rule which designers follow in this respect. In general, it may be said that the speed of the motor affects the stiffness of the spring more than the points you mention as at high speeds it is necessary to have a spring which will close the valve sufficiently rapidly to prevent the cam from running away from the follower. It must be remembered that the spring acts with the gas pressure against the cam action so that in lifting the valve, the cam must lift the load of the spring plus the load due to the area of the valve upon the pressure is acting. In closing, the gas pressure is immaterial as at that time it has generally reached close to atmospheric.

2—Some of the concerns which you mention object to the publication of details such as the valve spring pressure. On the Duesenberg motor, for the eight-valve type an 80-lb. spring is used on the intake and a 90 on the exhaust. For the sixteen-valve Duesenberg the intake valve spring is 60 lb. and the exhaust 70. The eight valves are $2\frac{3}{16}$ in. diameter and the sixteen valves are $1\frac{13}{16}$ for intake and $1\frac{1}{8}$ for exhaust. Owing to the heavier valve on the eight-valve type it will be noted that slightly heavier springs are used. On the Chalmers 6-40 model 32 the valve spring pressure is 49 lb.

3—The nearest concern to you of which we have record is the Empire Panel & Veneer Co., 940 Seneca St., Buffalo, N. Y.

4—This subject takes up more space than is available here but if you will secure any standard work treating on Froude's laws of friction you will find therein the information you desire.

5—The wind resistance curve published in THE AUTOMOBILE for Sept. 2 is based on the well-recognized Smeaton's table, which is largely used in building calculations. There are various other formulas which give wind resistance results which vary from Smeaton's calculations, but the latter are generally accepted.

Use Dull Paint Under Varnish

Editor THE AUTOMOBILE:—I have a Ford roadster and want to repaint it. I want the running gear a bright red, the fenders black and the body blue. In painting it would be advisable to use a paint with a glossy finish over the

old paint or to use a dull finish paint and varnish it afterwards?

Laceyville, Pa.

B. W. F.

—It would be better to use a dull colored paint rubbed down and finished with varnish. You can obtain the materials required at any paint store.

Wheel Warmers Consume Little Current

Editor THE AUTOMOBILE:—I am contemplating the use of electrically operated hand warmers on the steering wheel of my Dodge car. Do devices of this sort consume a very great amount of current? Inasmuch as I keep my car in an unheated garage and it requires considerable spinning to start the motor on cold mornings, I do not want to run any risk of having my battery fail me. What can you advise?

Bedford, N. Y.

G. A.

—These devices consume very little current and should not prove to be a serious drain on your battery. Entire steering wheels embodying this feature may also be purchased very reasonably.

Franklin's Thermal Efficiency is High

Editor THE AUTOMOBILE:—What is the average operating temperature of the Franklin air-cooled motor? What advantages do the manufacturers claim for it and what is the effect of the higher temperature on the thermal efficiency?

Lawrence, Kan.

B. B.

—The average operating temperature of the Franklin car is a little higher than that of a water-cooled car. The possibilities of going considerably higher can be seen by a study of the cooling system.

Just as it is difficult to say what is the average temperature of water-cooled cars, so it is difficult to say what it is with the Franklin. The maximum temperature at which a water-cooled motor can operate is naturally the boiling point of water, or normally 212 deg. The maximum temperature used in this motor is 350 deg.

The oil recommended by the Franklin company has a flash point of 435 deg. and a fire of 490 deg. Naturally the higher the temperature, and providing the lubrication is satisfactory, the greater the thermal efficiency.

Information on the 1914 Cadillac

Editor THE AUTOMOBILE:—What is the actual horsepower of a 1914 Cadillac?

2—What is the bore and stroke of this car?

3—As I understand, this car has a double axle and has four speeds forward. What is the maximum speed that this car can make on third speed and what is the maximum speed it will make on its high-speed axle or its fourth speed?

4—What does this car weigh?

5—When the pressure of this car is pumped to 1½ lb., it drops to about ½ lb. pressure in about 6 min. What is the cause of this?

Brooklyn, N. Y.

B. U.

—The actual horsepower of this motor is between 40 and 50.

2—The bore and stroke are 4½ and 5¾, respectively.

3—The rear axle of the 1914 Cadillac is fitted with two direct drives. The transmission was supplied with three speeds. It was intended that the transmission and axle be operated in the following manner:

Start the car on low gear, shift into second, then into high in the transmission. Then when the speed of the car increases to 19 m.p.h. or higher, shift the axle into the high direct, providing, of course, that the car is being driven at the time over fairly good roads and in reasonably level country.

4—The shipping weight of the five-passenger 1914 Cadillac was 4095 lb.

5—If the air pressure drops from 1½ lb. to 1 lb. when the engine is running it indicates either that the pump is not properly lubricated or that the pump cylinders or pistons are worn somewhat.

Single Electric Lighting for Ford

Editor THE AUTOMOBILE:—Please tell me how I may wire a Ford car for electric lights and have two independent systems; the storage battery to be wired in parallel and the magneto in either series or parallel.

It must have a foolproof switch so that only one system can be turned on at a time.

Modesto, Ill.

K. L. N.

—It is not practicable to attempt to operate the headlights by two different systems, and if you use a storage battery it will be necessary to disconnect the present lighting wires to the magneto. The lights cannot be operated by both the storage battery and the magneto at the same time with satisfactory results. By attempting to do so you would undoubtedly demagnetize your magnets and cause ignition trouble. A storage battery cannot be recharged by the Ford magneto.

Wants Information on 1910 Thomas

Editor THE AUTOMOBILE:—Will you kindly answer the following questions pertaining to a 1910 model M Thomas car?

1—What is the cause of poor compression in two of the cylinders after the valves are properly ground in?

2—Would you advise putting in patent piston rings?

3—Is there any arrangement to advance the timing of the valves without touching the timing gears?

4—How do you time an engine of this make?

5—What are the functions of the ¾-in. set screw and lock nut set between the pairs of tappet bushings?

6—What causes a grinding noise in the transmission on level ground and when going up hill the noise ceases?

7—What are the adjustments on the Stromberg carburetor on this model?

8—Could you tell me of any 1914 body which I could put on this car without many alterations?

Lynn, Mass.

C. C. S.

—This is probably caused by the cylinders being worn out of true, or perhaps a scored cylinder or poor rings.

2—Unless the cylinders are round new rings will not do any good. If they have been worn oval it will be necessary to have them reground. If oversize pistons are fitted any reliable ring will do.

3—No, except by changing the adjustment of the push rods.

4—The two important things in timing the motor are the closing of the exhaust and the opening of the intake. On this motor the exhaust valve should start to close on the exhaust stroke 1/32 in. over center and the intake valve should start to open 1/16 in. in all. If this is carefully done and the push rods are given 6/1000 to 7/1000 in. clearance on the exhaust side and 4/1000 to 5/1000 on the intake side the timing will be correct.

5—The set screw and lock nut between the cylinders are to hold the camshaft bearings in place.

6—It is possible that the trouble is in the trunnion or it may be in the differential. This would have to be determined by a mechanic.

7—The adjustments on the Stromberg carburetor are made through the adjusting screw on the air spring at the bottom of the air intake for low speed and the adjusting nut on the top of the intake for high speed. It is also necessary to see that all joints are right and the proper spray nozzles are used.

8—I would be almost impossible to fit a 1914 body.

The FORVM

First Aluminum Alloy Pistons Made in France

London, Eng.—Editor THE AUTOMOBILE:—With reference to the letter of Joseph Leopold regarding aluminum alloy pistons in your issue for Nov. 25, we know nothing about American aluminum alloy pistons as we have not had the good fortune to be able to test them, but we have no doubt that they are satisfactory.

Our reason really for writing to you is in the interests of historical accuracy, since we see that Mr. Leopold claims that a German alloy was used almost exclusively for aluminum alloy piston construction in Europe. To be quite correct, this is in no way the case since the first aluminum alloy pistons ever manufactured and fitted to motor car engines were produced by Messrs. Maxime Corbin et Cie. in France eight years ago. These pistons have been fitted as standard by Messrs. Chenard et Walcker for the last five years and by Messrs. Doriot, Flandrin & Parant for the last two years. We believe that neither of these firms has ever had to replace an aluminum piston during this time and we know that large numbers of Chenard et Walcker cars are in use in different parts of the world without their owners being aware that they are fitted with aluminum pistons.

The article by Mr. Sherbondy struck us as being very close to the truth and we do not see why Mr. Leopold should state that the European aluminum pistons were only worthy of superficial consideration, unless, of course, he is referring to the German ones, since he admits that his company has been able to improve on these.

This letter is simply written with a view to informing your readers of the situation as we could not hope to sell European pistons in America and have nothing to gain in this connection.—THE ALUMINUM PISTON CO.

Oversize Tire Advantages

By Charles E. Manierre

EDITOR THE AUTOMOBILE:—Up to date the tire manufacturers seem to have made no special effort to set forth the virtues of the over-size tires. It therefore seems proper occasionally to refer to the subject in your paper and to emphasize the fact that such tires when used should not be inflated to a pressure equal to the regular sized tire and much less than the pressure sometimes stamped upon the casing.

Referring to your issue of Nov. 25 last, at page 956, we are reminded that the standard sizes recommended by the S. A. E. are limited to the following: 30 by 3, 30 and 32 by 3½, 32 and 34 by 4, 34 and 36 by 4½, 36 by 5, 38 by 5½. That is to say, only nine regular sizes for the use of manufacturers, all of them an even number of inches in diameter, and for each of these regular sizes an over-size 1 in. larger in diameter by ½ in. larger in cross section.

It is to be hoped that automobile makers will keep to the even sizes so that individuals may always have the option of increasing their insurance against blowouts by purchasing the over-size tires.

Your issue of Oct. 22, 1914, contained an interesting letter

ADVANTAGES OF OVER-SIZE TIRES WITH LOW AIR PRESSURES IN GIVING FREEDOM FROM BLOWOUTS—HISTORY OF ALUMINUM PISTON

from Mr. Parsons of the Palmer Tire Ltd., including a table showing the diminishing pressure in pounds per square inch for any given load for each ½-in. increase in the size of the tire. For example: a load which requires a 60-lb. pressure on a 3½-in. tire requires only a 48-lb. pressure on a 4-in. tire, or 42 lb. for 5 in. Also a heavier load, requiring 80 lb. for 3½-in. requires 62 for 4-in., 56 for 5 in., 40 only for 6 in. This diminishing inflation is in accordance with common sense.

So far as the cost is concerned, a set of six regular sized tires costs about the same as five over-size tires. But the five over-size tires will outlast the six regular tires, and at the same time give much less trouble, together with more comfort in driving. I have seen from time to time a number of letters warmly praising the use of the over-size and none whatever discouraging such use.

My own experience in three years' driving, using the over-size (35 by 4½), gives but a total of three inner tube punctures on the road, and I think that each of these was more or less my own fault. Prior to the change from the regular tires the punctures had been quite a common incident.

For a time after putting on the over-size I faithfully inflated them to the pressure of 90 lb. stamped upon the casings, and hard riding was the immediate result. Later on the pressure not infrequently fell as low as 35 lb., both front and rear, and I have no idea how much driving I did on those under-inflated tires. I believe that it was a great many miles at or near that pressure. The fact that they were under-inflated did not appear when the car was standing without passengers. It would seem that instead of 90 lb., 60 lb. for the front wheels and 70 for the rear wheels is the outside that would be necessary. By this I do not mean that those are the pressures that should always be found in the casings, but the pressures to which they should be inflated with the expectation that they will run down somewhat below those figures in the course of driving. This over-size and the pressures mentioned should take care of a 3000-lb. car with five passengers.

May I suggest that in addition to increased comfort there is more satisfaction in driving with tires which scarcely ever bring one to a halt by the wayside and in not having (even with two extra casings inflated and ready for substitution) the lurking fear that two blow-outs may not be the sum total for the day. One extra over-size casing is an almost absolute insurance against any tire repairing at inconvenient points on the highway.

I confidently urge upon the prospective purchasers of tires the favorable consideration of the over-size question, particularly as the regular size tubes can be used in the over-size casings so that the expense of the change is only for the actual casings themselves.

The History of the American Automobile Industry—14

Activity in France Began Mainly After 1870—Bollee, De Dion and Serpollet Amongst the Pioneers—Internal Combustion Engine Soon Replaced Steam

By David Beecroft

IN 1861 the government of Britain passed a uniform tolls act and added to the difficulties of the situation by regulating the engine sizes, the weight on each wheel and limiting the speed to 10 miles in the country and 5 miles per hour in the cities. Also requiring at least two men with each vehicle. Seeing that the power vehicle was not wholly killed by such treatment an amendment was passed in 1865 limiting the speeds to 4 and 2 miles respectively and requiring an attendant sixty yards ahead with a red flag to warn riders and drivers. Naturally the business could not continue much less grow and the hardy pioneers were whipped, not by the problem, but by the vested interests speaking through the law makers.

France Starts in 1870

In France very little was done prior to about 1870. The firm of Lotz, of Nantes, were traction engine builders and their engines were frequently used to haul omnibuses, but they built a sort of steam carriage in 1865. With civil war and an immense new country to develop in America, with foolish restrictive laws in England, France became the logical development ground for the yet-to-be vehicle. The velocipede had gained considerable favor both in Europe and America and while largely out of fashion in America had left its imprint on British and French mechanical minds.

The next 20 years was to impress three names in particular on the minds of American students, viz., Bollee, De Dion-Bouton and Serpollet. Amidee Bollee seems to have begun his work as early as 1872 and built a number of steam automobiles, one of which was exhibited at the Paris exposition in 1878. This vehicle, or a mate to it, was also shown in Berlin and Vienna and driven over much of central Europe. It had the engine inclosed at the front of the vehicle, much like modern gasoline cars. It was the pioneer in this design.

The boiler was vertical and at the rear with coal bins each side, and the vehicle could travel 18 to 22 m.p.h., using for that distance 8½ to 11 lb. of coke. In many ways it marked a very considerable advance from the cruder and heavier structures that preceded it, if we except the several light steam buggies that had been used in America.

Another small vehicle turned out by Bollee about

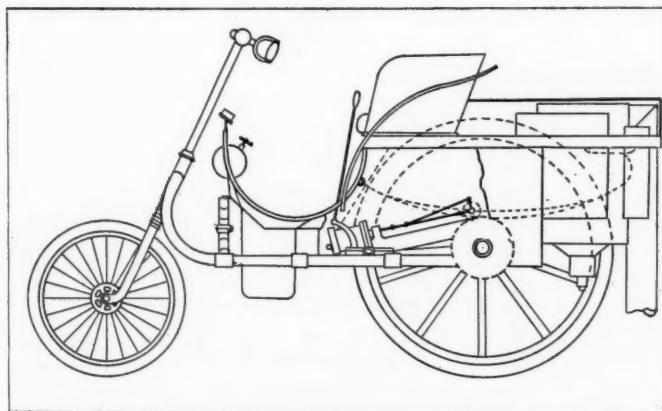
1885 had a wheelbase of 75 in. and a gage of 33 in. Its frame was of steel, as were the wheels of which the fronts were 30 in. in diameter and the rears 39. The boiler was located in front with a water capacity of 7½ gal. The total weight was but 1430 lb. and the speed from 21 to 24 m.p.h. maximum.

De Dion Starts with Steam

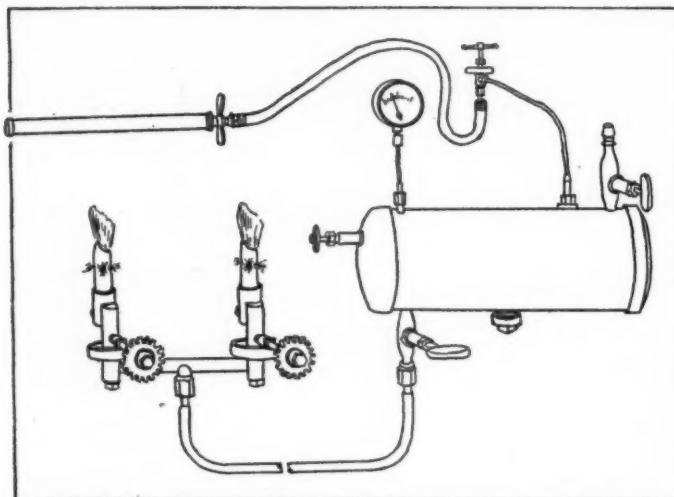
Count de Dion and his partners in manufacturing took up the automobile problem in 1883, and began with that best known motor, the steam engine. With them as with all others, the biggest obstacle to producing a light vehicle was found in the boiler and it was not till 1884 that they appeared with a tandem tricycle having the boiler and engine in the place of the second seat. This attempt was quite light, its motor had about 1 hp. and could run up to 18 m.p.h. on perfect roads.

In 1885 they brought out another tricycle in which the steam generator was carried between the steering wheels and the seat over the rear wheel, which was driven by a tandem compound steam engine directly connected. This machine was driven by Bouton as fast as one kilometer per minute.

In the next 8 years they made a number more of these vehicles of different types, including a small carriage carrying its entire mechanism at the front but with the connecting-rods of the two tandem compound engines extending to and driving the rear wheels. The seat was wide enough for four people, and the weight about 1300 lb.



One of the first Serpollet steam cars



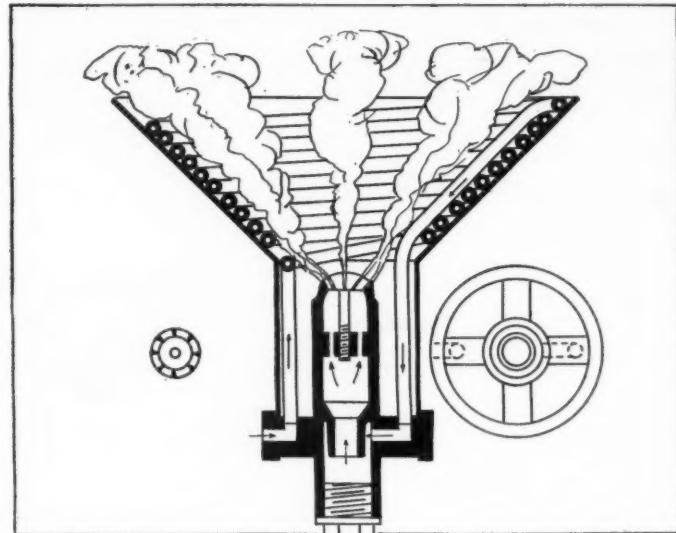
The principal parts of the Longuemare burner for a flash boiler of the Serpollet type, including fuel tank and air pressure pump to spray the gasoline.

They next turned their attention toward steam tractors and won the Paris-Rouen contest of 1886 with one of these. Its front wheels were rubber tired, but the rears were shod with iron. It weighed 3500 lb. empty, and 5000 lb. loaded and charged with water for 20 miles, and fuel for 60. Its construction embodied a form of full floating rear axle.

Serpollet's Flash Generator

Both Bollee and De Dion soon took up the gas engine and so the best known French advocate of the steam vehicle is Serpollet. Confronted as was De Dion and every other builder for road use, with the fact that the demands for steam varied almost constantly and over much range he took up the problem of the steam generator and produced one having flattened tubes which exposed a very large surface to a small amount of water. These flat tubes opened up and so defeated his intent, which objection he met by making them curved in cross-section. He also used very thick walls and attempted to store the heat in these walls so that when a sudden demand for steam came the walls themselves would largely meet it. His first vehicle, built about 1886, was a very crude tricycle design with boiler at the rear. His next tricycle had rubber tires and was a noticeable improvement. The next year, 1889, he built a seven-passenger tricycle weighing 2500 lb. empty, and about 4000 lb. loaded. The rear wheels were driven by chains from the shaft of a horizontal two-cylinder engine. Fuel for 40 and water for 20 miles were carried. The inventor relates that he drove this vehicle 144 miles from Paris to Douai on less than 12 francs' worth of coke. He averaged 17 m.p.h. over some stretches and thought a maximum of 25 miles was reached at times. Later an American named Gardner joined him, and the Gardner-Serpollet steamers became well known in the early years of the modern industry.

In 1883 a highly ornate coach was brought out by a Dr. Church. This used spring wheels 8.5 ft. in diameter with tires 18 in. wide, and a single smaller wheel in front for steering. Its passenger



Details, in a diagrammatic form, of a Longuemare burner intended to burn kerosene

load was fifty people and it employed a set of full elliptic springs on the front, a distinction from Hancock's carriages which seems to give preference to semi-elliptic. Church seems to have continued his experiments for about 5 years.



Wheels of Progress

Along the New York Central Lines the manufacture of motor cars, the Fourth Greatest American Industry, has arisen to a position of commanding importance within the past fifteen years.

Of the more than 2,000,000 automobiles operated in this country, more than nine-tenths were built in the industrial centers served by this railroad. Plans for the construction of nearly a million new cars in 1916 prove that the motor car has become an economic necessity. It has become the horse of the farm, the truck of industry, the wagon of commerce, the carriage of society, the chariot of war.

It facilitates transportation and expedites business. It brings millions of people within easy reach of the railroad, "the people's automobile." It helps to make travel a pleasure, the purpose and achievement of

The New York Central Lines

The advertisement of which this is a reproduction, recently appeared as a full page in various prominent daily newspapers. It is particularly noteworthy because it shows how greatly the attitude of the railroad companies has changed toward the automobile. A few years ago such an advertisement would have been deemed utterly impossible.

ACCESSORIES

Jones Pneumatic Spring

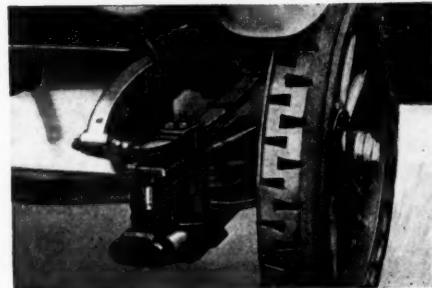
How to secure pneumatic tire action with solid tires is a question which has been the subject of a number of inventions during the last few years. A very ingenious method of solving the question is suggested by the Jones Pneumatic Tire Spring Co., which, as the name implies, incorporates the pneumatic action with the spring, although the car itself is equipped with solid rubber tires.

In other words, the Jones pneumatic tire spring utilizes the principle of the pneumatic tire as a cushion but takes it away from the road, thus eliminating wear on the pneumatic unit from riding friction, blowouts, rim cuts, punctures and other familiar tire troubles. The device can be attached to any car without mechanical changes and as suggested by the illustration, this is done by simply removing the spring clips and installing the Jones axle clips.

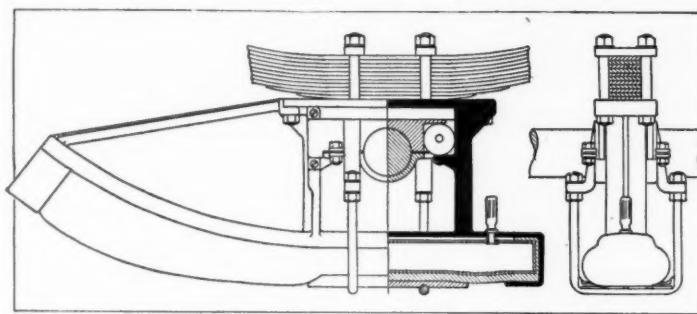
As shown by the illustration, the pneumatic cushion is slung beneath the axle in such a way that the upward or downward thrusts on the spring are communicated to it by the pneumatic medium, while the car itself is equipped with solid tires. The pneumatic units are not subjected to any wear except that due to cushioning shocks and they can be kept to any desired pressure by inflating through the valves with which they are equipped. The Jones pneumatic springs are \$150 a set, except for Fords for which car they sell for \$50 per set.—Jones Pneumatic Tire Spring Co., New York City.

Jay & Dee Watch Holder

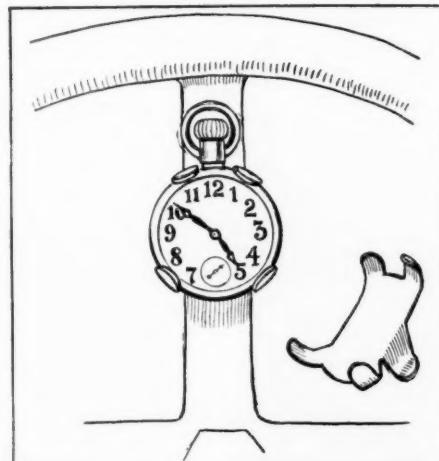
This watch holder is a felt-lined one-piece steel clamp, down-turned fingers of which grip one arm of the steering wheel, while four upturned fingers clasp the watch. The clip holds the watch firmly in place, but not so tightly that it cannot be easily detached by a pull when leaving the car. It can then be carried in the pocket, being a standard timepiece with special dial and hands. The watch and clip are not sold separately, the combination listing at \$1 each.—Jay & Dee Specialty Co., Inc., New York City.



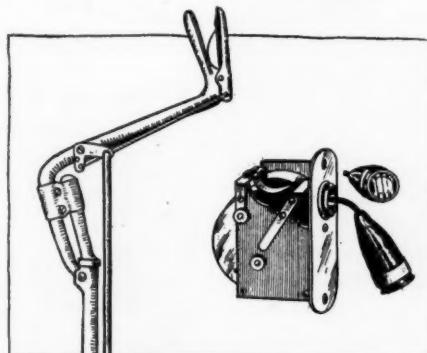
Jones Pneumatic Spring



Section of Jones Spring



Jay & Dee watch and holder on wheel



Left—Grout's lever extension. Right—Electric cigar lighter

Grout's Lever Extension

This is an offset extension for the Ford brake lever which brings the handle 7 in. closer to the driver and makes it considerably easier to manipulate the brake. The latch handle is carried along with the extension so that the brake is used in the same way as with the straight handle. Attachment is made by a clip and a single bolt and the work can be done in a few minutes without fitting or machine work. The device is of steel, finished in black enamel. Price, \$3.50.—B. F. Grout, Derby, Vt.

Weaver Bucket Grease Pump

This device consists of a heavy valveless grease pump; is detachably mounted in a large bucket so that it can be used in three ways; grease can be pumped from the bucket into a gearbox or rear axle housing; it can be pumped from a case or housing into the bucket; and it can be pumped from its original can or barrel into the housing, without using the bucket. Valves are eliminated by using ports which are covered and uncovered by a slight turn of the pump barrel. The barrel holds exactly 1 lb. of grease or heavy oil and is 2 in. in diameter, made of heavy brass tubing. The bucket of sheet steel, has a two-part cover, one section sliding within the other, and holds 25 lb. of grease. The hose used is of flexible steel and is $\frac{5}{8}$ -in. in diameter. The illustrations below show the handiness of the bucket pump. Not only is time saved by using it, but much waste of lubricant. Price, \$12.—Weaver Mfg. Co., Springfield, Ill.



Weaver bucket grease pump, showing two methods of using

Detroit Gears for Fords

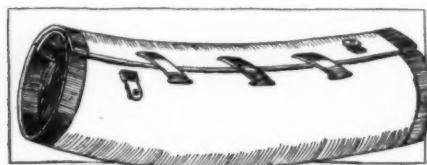
These special gears are designed to permit an increase of speed where conditions are favorable or to lower the gear ratio of Ford cars for very hilly country, being supplied in one ratio lower than the standard, 3.63 to 1, and three higher. The low ratio is 4 to 1, and the higher ratios 2 1/4 to 1, 2 4/7 to 1 and 3 to 1, the highest, or 2 4/7 to 1, gear being for racing purposes, the 2 1/4 to 1 for fast roadsters, and the 3 to 1 for general driving. Gears are nickel steel, hardened and sand blasted, all except the racing type being interchangeable with the regular Ford gears. A little machining is necessary for the installation of the racing gears, instruction for which is furnished. The gears offer a very simple means for saving gasoline as well as for gaining speed, as the use of a slightly higher ratio in flat country, will reduce the fuel consumption in practically the same proportion as the gear has been raised. The gears sell for \$15.—Detroit Radiator & Specialty Co., Detroit, Mich.

Cutler-Hammer Grounding Switch

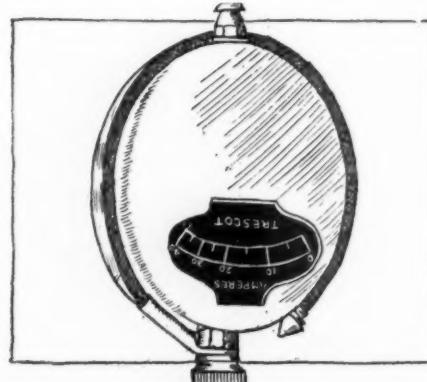
This switch is designed to ground the magneto circuit and so prevent the operation of the car until the ground is removed. The ground is established by pulling out a plug, which is small and may be carried on a key-ring when not in the switch. The switch may be installed in any convenient place. It sells for 76 cents.—Cutler-Hammer Mfg. Co., Milwaukee, Wis.

Dover Offset Funnel

The Dover funnel is designed for filling tanks which cannot be conveniently reached with a straight funnel, its offset spout giving a horizontal reach of 10 in.



Polson's rubber-ended blow-out patch

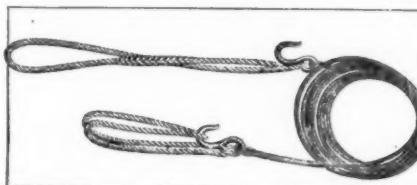


Trescot thin model pocket meter

The spout outlet is $\frac{3}{8}$ -in. diameter and the top of the funnel $10\frac{1}{4}$, the capacity of the funnel bowl being 1 gal. The material used is copper-plated steel. The spout is removable for compactness. Price, \$2.—Dover Stamping & Mfg. Co., Cambridge, Mass.

Polson's Blow-Out Patch

This blow-out patch is of heavy white friction fabric with red rubber ends, the entire patch being vulcanized over a mold. A flap prevents pinching, the fastening being a self-adjusting strap. When air pressure is applied the patch expands at the ends and tightens in the middle, preventing pouching at the blow-



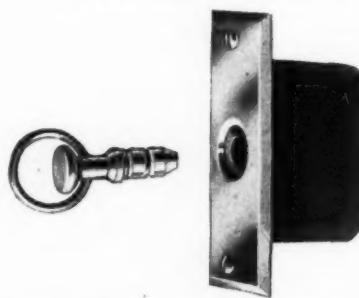
U. W. steel towing line and slings



Dover funnel with offset spout



Gears for changing Ford ratio



Cutler-Hammer magneto grounding switch

out. The 3-in. size sells for 80 cents; 3 1/2-in., 90 cents; 4-in., \$1; 4 1/2-in. \$1.20, and 5-in., \$1.40. All the patches are 10-in. in length.—Polson Rubber Co., Kansas City, Mo.

Trescot Pocket Testers

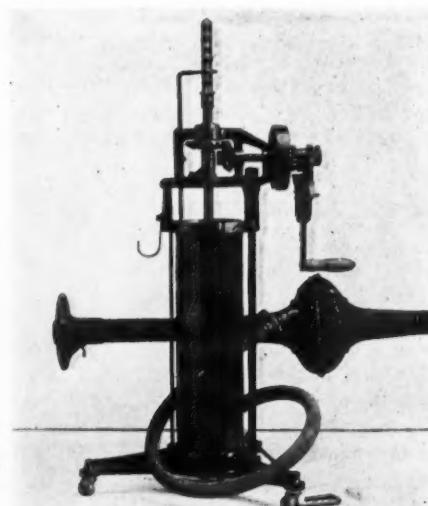
The Trescot pocket meters for battery testing are somewhat smaller than the standard Sterling pocket instruments, and, while possessing the same constructional features, are little more than $\frac{1}{2}$ in. thick and $1\frac{1}{4}$ in. in diameter. They consist of: Ammeter, 40 amp. in 5-amp. divisions; voltmeter, 10 volts in $\frac{1}{2}$ -volt divisions; voltammeter, 40 amp. in 5-amp. divisions and 10 volts in $\frac{1}{2}$ -volt divisions. The ammeter sells for \$1, the voltmeter \$1.10 and the voltammeter \$1.35.—Sterling Mfg. Co., Cleveland, Ohio.

Ekern's Garage Grease Gun

A new model Ekern's grease gun has been brought out having a heavy seamless steel cylinder 6-20 in. and holding 20 lb. of grease or $2\frac{1}{2}$ gal. of liquid oil. The tank is mounted on wheels. The hose is 5 ft. long and has a special nozzle and shut-off at the end. A scale at the top measures grease accurately and checks the amount used. A new feature is an extra set of gears which makes it possible to bring the piston from the bottom of the cylinder to the top, when the container is empty, at three times the descending speed. The piston is lifted out and swung to one side to fill with grease or oil. The gun sells for \$30.—Ekern Bros., Flandreau, S. D.

U. W. Pull-Out Line

This is a steel wire cable for towing work, the hook spliced on each end being fitted with two manila rope slings for making fast to axles to give flexibility in towing and to prevent marring of the finish. The line is 25 ft. long, including the slings in towing position. It sells for \$2.—Upson-Walton Co., Cleveland, Ohio.



Ekern's new model garage grease gun



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Materials and Makers

STAND by us and we will stand by you." This is the attitude that some of the large parts manufacturers seem to be taking toward the makers of raw materials. The concerns which furnish the makers of automobile parts with raw materials know that this shortage is but a temporary one, and it would be indeed foolish and short-sighted for them to raise the price to a prohibitive degree to customers whom they know to be steady and good for business for an unlimited number of years.

This attitude toward the parts manufacturer, who buys in such large quantities that his business is cherished, is the only possible fact that can explain the large number of recruits to the passenger car manufacturing business. These new concerns are all in the assembling rather than in the manufacturing business, and this means that they must be able to purchase parts at prices which will enable them to compete with cars which are built complete in the home factory.

The fact is that the price of materials has not so seriously hampered the parts makers that they cannot continue to sell parts to new concerns. The feeling of fear against serious shortage that was noted a few months back seems to be passing over, and the small manufacturer does not seem in the least worried at the present time.

Chicago Meets Expectations

AS was anticipated on all hands the Chicago exhibition proved to hold few surprises of a mechanical nature. It is practically a repetition of the New York exhibition with hardly a difference in the cars. Reports of the first few days prove that it is a great success, the attendance being good and the scheme of decoration, on which so much trouble has been lavished, voted remarkably effective.

That color in connection with automobiles is beginning again to be considered was indicated in New York, and emphasized at Chicago. The effect of so large a display of bodies with carefully chosen paintwork and upholstery is bound to be great. At both shows it was easy to see that the neatly colored car, not the gaudy eye-stunning creation, but the quiet red or blue or gray, attracted much favorable comment. This means that the public taste is being educated away from the unsuitable black toward a more serviceable and more attractive scheme.

It is unquestionably a fact that dealers find the offer of a choice of color a great advantage, even if the color cost a little more than standard black. Probably this is because it allows a customer to impress his own individuality upon his automobile to some extent, giving him a car that is recognizable from his neighbor's without a critical inspection.

Detail Refinements

IT was pointed out at the recent meeting of the Metropolitan Section of the Society of Automobile Engineers that no radical changes in automobile design had been made during the past year, and that all the changes are in the nature of detail refinements. This is an interesting viewpoint, and at once brings the observer back to the question of what is, and what is not, a radical change. Certain it is that the introduction of the spiral bevel drive, for instance, into the lower-price cars must mean that somewhere someone has found a process which radically cut the price of manufacture of these parts.

So on throughout the entire gamut of changes made during the year. On the car they appear as minor refinements, but each one of them stands for something more than that in the plant of the manufacturer.

The reflection that detail changes have on the whole make-up of the car is a point not to be overlooked. Apparently it makes little difference to the car user if the cylinders are cast in block or singly, but when he stops to consider that the block-cast motor shortens the hood and gives more room throughout the entire body for a given amount of wheelbase it begins to be evident that the change does affect him. Vacuum feed, apparently, is not connected with baggage space, and yet the fact that the tank is removed to the rear allows for much greater carrying capacity under the seat. Each alteration has effected some other part of the car besides that with which it is intimately connected, and while improvements in themselves may be classed as minor, yet the *tout ensemble* has been definitely improved.

Jordan Motor Car Co. Organized

Capitalization \$800,000—Company Is Based on Co-operative Plan

CHICAGO, ILL., Jan. 25—The work of organizing the Jordan Motor Car Co. was practically completed at a meeting of the stockholders held here to-day. Two-thirds of the preferred stock issue of \$300,000 was subscribed and reservations made for at least one-half of the remainder by persons desiring to distribute it among their friends and business associates.

The company is based on the co-operative idea in which E. S. Jordan, president, has associated with him on a stockholding basis practically all of the dealers who have to date arranged to handle the product; and besides several men interested in the manufacture and sale of components and accessories. To this list have been added the names of several well known advertising and newspaper men. A portion of the unsubscribed stock is being held for prospective dealers who have expressed an interest in the new organization.

The organization prospectus calls for a total capitalization of \$800,000, including \$500,000 preferred and \$300,000 common. Of the preferred \$200,000 is being held in the treasury. The common stock is given as a bonus with the preferred on the basis of one-half share to every share of preferred. The preferred pays 7 per cent cumulative and is redeemable at the company's option of two years at 110.

Already all the specifications of the Jordan car have been decided upon and parts for 2000 machines contracted for with the most reliable parts makers, these including such names as Continental, Timken and Brown-Lipe.

The car is a six-cylinder design, the chassis assembled from components as indicated and with particular attention devoted to body design, the lines of which incorporate the latest tendencies in custom body work. Appearance, comfort, power and durability have been aimed at.

New Tire Pump Ready

NEW YORK CITY, Jan. 20—The Edward A. Cassidy Co., Inc., this city, is introducing an engine-driven tire pump under the name of the Cassco. This pump, a single-cylinder device, is listed at \$8. It is claimed that the device contains new constructional features, covered by Cassidy patents, which eliminate all piston difficulties. At present fittings are furnished for Buick, Stude-

baker, Chandler, Chevrolet, Dodge, Reo, Saxon, Overland and Hudson cars. Fittings for other cars are being prepared. The pumps will be ready for delivery Mar. 15.

Three new men have been added within the past week by the company. They are R. G. Ames, G. B. Gosman, and C. P. Brewster. Mr. Ames will cover the Western territory for the company and will make his headquarters in Chicago. Mr. Gosman, formerly assistant general manager of the automobile accessories division of the H. W. Johns-Manville Co., has been elected secretary. Mr. Brewster will cover Pennsylvania and the South for the company.

Burr Leaves Woods Electric

CHICAGO, ILL., Jan. 25—Information has just become public that Louis E. Burr for many years at the head of the Woods Motor Vehicle Co. has severed his connection with that concern.

Mr. Burr resigned early last November. "I left the Woods Co., selling out my interest nearly three months ago," said Mr. Burr to-day. "But it was a part of my agreement not to make the matter public. The company was planning a new car and it was thought best not to announce my retirement from the organization." Mr. Burr now is engaged in the bond business in Chicago.

A. A. A. Assigns Race Dates

NEW YORK CITY, Jan. 22—The following dates have been assigned for automobile contests during the coming season. Those marked * have been assigned official sanction numbers and the other dates are tentatively assigned pending completion of the preliminary requirements under the contest rules:

Date	Event and Promoter
Feb. 22	Speedway—Los Angeles Ascot Speedway Assoc.
May 6	Speedway—Sioux City Sioux City Speedway Assoc.
May 13	Speedway—New York Sheepshead Bay Speedway Co.
May	Speedway—Chicago (Amateurs) Speedway Park Assoc.
*May 30	Speedway—Indianapolis Indianapolis Motor Speedway.
June 10	Speedway—Chicago Speedway Park Assoc.
June 28	Speedway—Des Moines Prince Speedway Co.
July 4	Speedway—Minneapolis Twin-City Motor Speedway Co.
July 4	Track—Coeur D'Alene, Idaho Hiller-Riegel.
July 4	Speedway—Sioux City Sioux City Speedway Assoc.
July 15	Speedway—Omaha Omaha Auto Speedway.
Aug. 5	Speedway—Tacoma Tacoma Speedway Assoc.
Aug. 18-19	Elgin Road Races Chicago Auto Club.
Sept. 4	Speedway—Indianapolis Indianapolis Motor Speedway.
Sept. 4	Speedway—Des Moines Prince Speedway Co.
Sept. 16	Speedway—Providence Narragansett Park Speedway.
Sept. 29	Track—Trenton, N. J. Inter-State Fair (H. P. Murphy, Racing Sec.)
Sept. 30	Speedway—New York Sheepshead Bay Speedway Co.
Oct. 7	Speedway—Omaha Omaha Auto Speedway.
Oct. 14	Speedway—Chicago Speedway Park Assoc.
Oct. 19	Speedway—Indianapolis Indianapolis Motor Speedway.

Harding Twelve Announced

New Car to Be Made in Cleveland—Experimental Work Completed

CLEVELAND, OHIO, Jan. 24—The Harding Twelve is Cleveland's newest car. It will be placed on exhibition at 1824 Euclid Avenue within a few days.

F. I. Harding, formerly treasurer of the Peerless Motor Car Co., and W. C. Spaulding, formerly president of a large knitting company, are the founders of the Harding Motor Car Co., which will manufacture and market the Harding car. A number of other prominent business men of this city will be interested in it. At present the offices are on the fifth floor of the Cuyahoga Building, but factory space will be secured at an early date and the company will begin to build cars for the trade.

Has Good Body

In appearance this car is rather foreign. Instead of the straight lines of the streamline car, curves have been used, blending into each other from the radiator through the hood, cowl and body to the rear. This renders the car distinctive, but not freakish. It sets low and is furnished with crowned fenders, cowed back to the front seat and is generally graceful in contour.

The motor of the new car is of the twin-six type. The cylinders, 2 1/2 by 5, are cast in blocks of six each and the heads are removable. The crankshaft may also be easily removed without disturbing the cylinders, this rendering it very convenient for making repairs and reducing the upkeep.

The carburetor is located on the left side and the starting and lighting units on the right, the V being left clear. The first car is a seven-passenger and it is probable that no other type of body will be built, not this year at least. Later on a roadster may be offered the public if it is seen that there is a call for it after the other car is out.

To Reorganize United Motor Truck

GRAND RAPIDS, MICH., Jan. 21—Prospects are said to be bright for rejuvenating the United Motor Truck Co., which has been in a financially embarrassed state for several months. A committee appointed by creditors to decide upon a feasible plan for overcoming the difficulties has reported that \$100,000 of the \$150,000 merchandise creditors have replied to letters and that the total will reach \$131,000. This figure does not include the \$80,000 held by banks and Frank T. Hulswit.

Metropolitan S.A.E. Discusses Show

New York Engineers Debate Developments of 1916 Cars

NEW YORK CITY, Jan. 21—At the meeting of the Metropolitan Section of the Society of Automobile Engineers, held at the Automobile Club of America, the nominations of officers for the coming fiscal year were announced by the nominating committee. The new nominees are Leonard Kebler, president Ward Leonard Electric Co., for chairman; Harry Tipper, advertising manager of the Texas Co., secretary; and H. G. McComb, engineer of the General Vehicle Co., treasurer. The officers held over from this year who will serve on the governing committee for the next fiscal year are R. McA. Lloyd, consulting engineer, present chairman and J. Edward Schipper, technical editor *THE AUTOMOBILE*, present secretary. Elections will take place at the next meeting which will be held Feb. 17.

The paper discussed at the meeting was entitled "Some Engineering Features of the 1916 New York Show," by H. H. Brown. It dwelt on the detail improvements which have been made during the year, especially in the refinement of parts of the car which have made it more efficient from the owner's standpoint. One of the points commented upon by Mr. Brown is the attention which has been given to the lubrication of the slower moving parts such as the springs, steering knuckles, spring bolts, etc.

Referring to the question of the multi-cylinder motor, Mr. Brown said:

"While there is little doubt but that the demand for the polycylinder motors over that for the four is largely a matter of style yet it is probably founded on the sound basis of a demand for a flexible car.

"While many of the manufacturers have sought to satisfy this demand by supplying six-, eight- and twelve-cylinder motors for their cars, yet there are others that have realized that flexibility in a car depends primarily on the number of impulses imparted to the drive wheel in a revolution rather than to the crankshaft of the motor.

"These manufacturers have therefore sought to give the public flexible cars by providing the car with a light, well built, well balanced, high-speed motor geared comparatively low on high rather than with one of many cylinders or large cylinder displacement geared comparatively high.

"There is no doubt but that the six-cylinder motor is a better naturally-bal-

THE AUTOMOBILE

anced motor than the four, hence to rival the absence of vibration in the six the advocates of the light high-speed fours have sought to obtain as good balance as possible by refining the details of design and by lessening the weight of reciprocating parts."

The discussion consisted chiefly of comments by the members on the interesting features of development as seen at the show. The more extended use of spiral bevel drive, thermo-syphon cooling, block casting, better brake arrangements and unit power plants excited particular interest. The absence of the transmission brake was also commented upon.

Gloetzner Vice-President Bour-Davis

DETROIT, MICH., Jan. 25—A. A. Gloetzner, assistant chief engineer of the Chalmers Motor Co., has joined the Bour-Davis Motor Car Co., Detroit, where he will have full charge of the purchasing and engineering departments. He is also vice-president of this new company.

Mr. Gloetzner has been actively connected with the production and engineering end of the automobile industry for about thirteen years. He was at one time assistant production manager of the Olds Motor Works. He also was factory manager of the Krit Motor Car Co. and also of the Owen Motor Car Co.

Bradfield Velie Sales Manager

MOLINE, ILL., Jan. 22—F. E. Bradfield, who has been associated with the Velie sales department almost since the inception of the Velie Motor Vehicle Co., has been appointed to the position of sales manager and will hereafter have jurisdiction over the entire sales organization. He will be assisted in his work by G. H. Lloyd, long connected with that company's sales, which to date, are over 400 per cent greater than those of a year ago.

Dunlap Chandler Sales Manager

DETROIT, MICH., Jan. 25—J. M. Dunlap will become sales manager of the Chandler Motor Car Co., Cleveland, Ohio, on Feb. 1. Mr. Dunlap was the organizer of the Dunlap-Ward advertising agency here, which had charge of the Chandler advertising campaign during the last two years.

Studebaker to Retire \$2,308,500 of Serial Notes

DETROIT, MICH., Jan. 22—The Studebaker Corp. has called for payment on March 1 of the remaining \$2,308,500 of its 5 per cent serial notes. This wipes out the last of the \$8,000,000 note issue sold March, 1912.

Grant Increases to \$4,000,000

Originally Capitalized at \$100,- 000 and Raised to \$200,000

CLEVELAND, OHIO, Jan. 25—The Grant Motor Car Co., Findlay, Ohio, is to increase its capital stock from \$200,000 to \$4,000,000, of which \$3,000,000 will be common stock, the shares having a value of \$10, while \$1,000,000 will be 7 per cent cumulative convertible preferred stock, of \$100 value per share. Of the common stock \$1,000,000 is reserved for the conversion of the preferred stock and the total authorized outstanding stock is thus \$3,000,000.

The preferred stock is now offered to the public by Andrews & Co., investment brokers in Chicago and Detroit, at \$105 with a bonus of 20 per cent in common stock. The 7 per cent preferred stock is convertible into an equal amount in par value of common stock, that is ten shares of common for one share of preferred, at the option of the holder at any time prior to Jan. 1, 1919. It is preferred over the common stock as to dividends and in the event of dissolution and liquidation, is entitled, in priority to the common stock to repayment in cash at 120 per cent and accrued dividends.

According to a statement of President D. A. Shaw, of the Grant Motor Car Co., the earnings of the company during 1915 were about \$165,000. The number of cars shipped was 4,006 while in 1914 the total shipped was 2164. The production for 1916 calls for 12,000 cars and the net earnings are estimated at \$720,000 for the year. Beginning July 1, 1916, it is expected that production will be increased on a basis of 15,000 cars annually.

The investment of the company in plant, machinery, tools, etc., is reported to be only \$79,239.66, which small amount enables the assets to be current and liquid at all times, and makes rather large earnings possible on a small capital investment. The company started in business in 1913, with a capital stock of \$100,000 which was doubled later.

Ray Harroun Leaves Maxwell

DETROIT, MICH., Jan. 24—Ray Harroun, of the Maxwell Motor Co., who built the Maxwell racing cars and was especially interested in the racing end of the engineering work, has resigned, and will, it is said, devote his attention to the Maxwell racing cars now owned by Carl G. Fisher and himself. No successor has been appointed as yet.

Baltimore Territory Needs 40 Per Cent More Automobiles for 1916

Tenth Annual Show Is Highly Successful—

Closed Cars in Strong Demand—Registrations in District Have Increased Over 66 Per Cent

BALTIMORE, Md., Jan. 24—Statistics gathered at the show staged in the Fifth Regiment Armory, Jan. 18 to 22, by the Baltimore Automobile Dealers' Association and the Automobile Club of Maryland reveal that the territory controlled by Baltimore dealers will absorb between 25 and 40 per cent more cars during 1916 than were absorbed in 1915. In actual figures, the State of Maryland registered in 1915, 27,858 pleasure cars, 3189 commercial vehicles and 1341 dealers. The total registration up to date shows that already there have been registered some 10,460 pleasure cars, 2124 commercial vehicles and 913 dealers. These figures include both the State of Maryland and the District of Columbia, and represent an increase of nearly 66 2/3 per cent for the same period last year.

Is Retailers' Show

The show was the tenth annual event to be staged in the city, and from a monetary point of view it was by far the most successful. All told, some 60 dealers of pleasure cars and commercial vehicles had exhibits, and as an indication of the size of the show suffice it to state that there were on view 157 pleasure cars and 71 trucks. Wednesday was the big day, the attendance figures totaling more than 9000, and even on Thursday, which was Society day and for which the admission charge was 50 cents instead of 25 cents, more than 6000 persons passed the ticket takers. The attendance figures for the week were approximately 20 per cent ahead of those for any previous year.

The show is essentially a retail function. Some few dealers and subdealers are appointed by some of the larger distributors who have space, though for the most part it is the Baltimore city dealer who has the exhibit. Accurate figures regarding the number of sales made at any show always are difficult to obtain, though from the reports of exhibitors it appears that sales were quite satisfactory and in many instances greatly exceeded expectations.

Not the least significant feature of the show was the great demand for closed cars and particularly for open cars which are fitted with detachable tops. That the advent of these detachable top cars has had a noticeable effect in bolstering up the sales curve during a time when it ordinarily drops considerably, cannot be gainsaid. In some cases dealers who

have not been able to get detachable top jobs from their factories have shifted their representation to be able to offer them.

Another noteworthy feature is the

great interest which Baltimore is taking in the commercial vehicle. Up to comparatively recently Baltimore pavements have not been what might be termed excellent, and this has had a depressing effect on the commercial vehicle industry. Now, however, Baltimore is probably one of the best paved cities in the country and this undoubtedly has had some effect in helping sales of trucks. There are at present 11,046 one-horse vehicles in Baltimore and 5025 that are drawn by two horses. These figures are practically the same as for the year 1913. Just how the motor vehicle is supplanting these is

Value of Baltimore's Industries

	No. of Establishments Engaged in	Total Employees	Value of Manufactures	Local Sales	Shipments
BREWING AND DISTILLING					
Malt liquors	12	933	\$5,820,841	\$5,529,799	\$291,042
Spiritous liquors	14	441	2,951,867	837,532	2,114,335
CEMENT, CLAY AND PRODUCTS					
Builders' materials	19	408	452,831	323,819	129,012
Brick	9	1,407	1,252,134	935,655	316,479
Crockery and pottery	3	70	204,000	134,000	70,000
Paving and roofing materials	7	796	4,062,766	3,994,080	68,686
CHEMICALS, OILS, ACIDS, ETC.					
Acids, fertilizer, etc	23	2,257	15,976,306	2,229,783	13,746,523
Paints, varnishes and dyes	11	300	1,933,084	323,550	1,609,534
Soaps and perfumery	11	150	441,519	190,211	251,308
Miscellaneous chemicals and oil	15	1,442	11,965,946	2,253,500	9,712,446
DRUGS AND PREPARATIONS					
Food products	65	1,702	6,673,355	987,346	5,686,009
Bakery products and flour	381	2,442	6,740,474	4,221,528	2,518,946
Cereals and spices	5	172	2,068,581	417,699	1,650,882
Preserved and canned foods	52	6,693	12,971,721	1,028,317	11,943,404
Slaughtering and meat packing	49	1,352	18,533,317	8,451,605	10,081,712
Candy and confectionery	50	2,448	5,680,978	1,317,578	4,363,400
Miscellaneous	12	361	2,199,167	374,755	1,824,412
FOUNDRY AND MACHINE SHOP					
Bridge and structural iron	11	682	1,344,388	548,780	795,608
Electrical equipment	7	194	478,870	299,225	179,645
Machinery	51	4,190	6,730,245	1,664,261	5,065,984
Railway cars and construction	6	5,211	11,422,110	1,990,000	9,432,110
Miscellaneous	39	6,520	11,833,751	1,209,348	10,624,403
GLASS AND PRODUCTS					
Bottles and glassware	5	1,322	1,681,521	490,915	1,190,606
Mirrors and stained glass	6	91	158,494	92,912	65,582
JEWELRY AND SILVERWARE					
Jewelry	14	116	322,100	187,780	134,320
Silverware	10	389	974,000	458,500	515,500
Miscellaneous	8	45	64,000	31,500	32,500
LEATHER AND MANUFACTURES					
Beltting	7	481	1,690,452	159,500	1,530,952
Shoes	7	673	1,885,000	511,750	1,373,250
Harness and saddlery	14	320	783,399	148,637	634,762
Finishing of leather	4	57	128,500	39,000	89,500
Miscellaneous	5	93	165,000	100,300	64,700
LUMBER AND MANUFACTURES					
Baskets, willow ware, etc	23	137	235,834	150,307	85,527
Boxes, barrels, etc	29	2,017	3,940,232	2,415,084	1,525,148
Furniture	35	2,158	4,754,330	1,165,296	3,589,034
Millwork	22	1,270	2,470,841	1,251,050	1,219,791
Miscellaneous	22	1,615	5,388,300	753,920	4,634,380
PAPER AND PRINTING					
Boxes and bags	20	1,208	1,935,930	981,810	954,120
Printing and publishing	204	4,897	8,763,817	5,208,463	3,555,354
Printers' supplies	17	225	434,288	283,489	150,799
Paper and stationery	5	157	232,695	76,928	155,767
TEXTILES					
Awnings, tents and sails	9	93	203,500	137,363	66,137
Cotton and burlap bags	4	203	1,621,769	622,634	999,135
Carpets and rugs	2	44	63,000	20,000	43,000
Cottons and prints	5	3,856	5,890,000	372,700	5,517,300
Clothing: men's and boys'	82	14,991	30,091,441	1,796,695	28,294,746
Men's furnishings	53	9,788	14,259,064	1,135,273	13,123,795
Hats and caps: except straw	12	339	480,232	103,250	376,982
Ladies' apparel	55	3,450	7,415,884	1,334,859	6,081,025
Miscellaneous	8	812	576,235	240,577	335,658
TOBACCO					
208	4,267	10,585,048	3,192,261	7,392,787	
TOOLS AND HARDWARE					
Builders' hardware	7	188	304,500	79,500	225,000
Miscellaneous	7	138	567,632	68,543	499,089
VEHICLES					
Horse-drawn	36	510	651,200	584,750	66,450
Motor and vehicle parts	12	181	479,162	242,587	236,575
MISCELLANEOUS					
Brass and bronze products	19	597	872,800	284,110	588,690
Brooms and brushes	18	579	776,055	215,500	560,555
Tin and sheet iron products	61	6,410	24,858,425	3,426,678	21,431,747
Flags, banners and regalia	6	120	141,525	51,250	90,275
Fur goods	15	47	246,000	167,500	72,500
Ice and cream products	42	1,186	2,433,200	2,138,510	294,690
Mattresses and spring beds	15	804	2,877,000	922,600	1,954,400
Millinery and lace goods	9	438	426,127	112,166	313,961
Shipbuilding	17	2,747	6,530,931	409,431	6,121,500
Stone and monument work	54	913	1,896,422	1,133,136	763,286
Umbrellas and canes	9	895	2,274,500	130,800	2,143,700
Straw hats	6	1,970	4,991,238	391,313	4,599,925
Miscellaneous	148	2,759	64,065,208	896,586	63,168,622

revealed by the truck registrations, which for 1915 were 3189, whereas up to date, for 1916, the number is 2124 and gives evidence of eventually showing an increase of considerably better than 66 2/3 per cent.

Covers Seven Counties

The average territory controlled by the Baltimore dealer embraces seven counties—Anne Arundel, Baltimore, Carroll, Cecil, Harford, Montgomery and Howard—with a total population of 295,755; some dealers have more territory, a few of the large distributors having the whole State of Maryland, and some have a little less. And throughout the whole of this territory business prospects are bright, for, as a trade center, Baltimore is growing rapidly. For example, the bank clearings last week totaled \$44,418,957, as against \$37,120,124 for the corresponding week last year. The increase has been consistent, and, if continued, will show a large gain for the year.

The population of Baltimore, according to the last census figures, is given as 558,485, though there is a project afoot at present to increase the size of the metropolitan district to give a total population of more than a million. Maryland is essentially a farming State, more than 82 per cent of the land area being included in farms, and of this about 68 per cent is improved. It may not be generally known that the State stands second in the canning industry and is led only by California. More than 40 per cent of the tomato pack of the United States comes from Maryland. The single industry of second rank is men's clothing, and this centers largely in Baltimore.

Baltimore Is Prosperous

At the present time, Baltimore is enjoying the wave of prosperity that is sweeping over the Southern States. In the opinion of dealers at the show, this section of the country is entering on a period of unprecedented prosperity, and as an indication of the possibilities of the territory the figures which are given herewith and which cover Baltimore's diversified trade interests are illuminating. These are taken from an industrial survey of the city which was brought to a close in December, 1914. Since that time a number of large industrial interests have located in Baltimore, though no figures are available as to their trade importance.

Jobbing Trade, \$250,000,000

Baltimore's jobbing trade, not including the commission business, reaches \$250,000,000 yearly. The leading items are dry goods and notions, millinery, clothing, boots and shoes, hats and caps, drugs, groceries and food products, all of which show large increases over the figures given in the United States Census report for 1910. In addition, there are

grain and shipping figures of over \$100,000,000 and a commission business of a like figure. As an indication of the grain trade, it is pointed out that Baltimore received in 1914 60,770,082 bushels of grain and 1,808,672 barrels of flour. Baltimore's imports for the calendar year were \$35,533,814 and the exports were \$117,269,378.

Following are figures which give the extent of the motor car industry in the State of Maryland and the city of Baltimore at present, from figures compiled by the Automobile Trade Directory:

	Maryland	Baltimore
Dealers	166	60
Repair shops	34	24
Garages	67	50
Supply dealers	31	30

Mason Tire & Rubber Co. to Be \$1,000,000 Corporation

KENT, OHIO, Jan. 22—At a meeting of the board of directors of the Mason Tire & Rubber Company this week, a resolution was adopted to increase the capital stock to \$1,000,000, and a meeting of the stockholders will be called within a short time to approve this step. According to a statement made after the meeting, building contracts have already been awarded.

Stutz Doubles Plant

INDIANAPOLIS, IND., Jan. 24—Work has commenced on a new four-story building, 80 by 208, of the Stutz Motor Car Co., which will give it double its present manufacturing capacity. The new building is being erected immediately north of the present plant and the contracts call for completion of the building, which will be a duplicate of the present factory, by June 15. President Harry Stutz says that this new building will make it possible for the company to manufacture more of the parts entering into the car which are at present purchased outside. The new factory will be an insurance against any possible tie-up due to shortage of certain parts.

Harry Bill Vice-President of Springfield Body Co.

NEW YORK CITY, Jan. 24—Harry Bill has become vice-president and general manager of the Springfield Body Co. and will have charge of production. Mr. Bill has been connected with the Hayes Mfg. Co., Detroit, in charge of production.

Elliott Leaves United Motor Truck

GRAND RAPIDS, MICH., Jan. 24—E. M. Elliott has resigned as vice-president and general manager of United Motor Truck Co., Grand Rapids, Mich. His future plans have not been announced.

John A. Hill Dies Suddenly

Famous Publisher Did Much to Develop Technical Journalism

John A. Hill, president of the Hill Publishing Co., died suddenly from heart disease on Monday morning, Jan. 24, while traveling in his automobile from his residence in East Orange, N. J., to his place of business.

Mr. Hill was fifty-seven years of age, having been born on Feb. 22, 1858, in the town of Sandgate, near Bennington, Vt. While a young lad his parents emigrated to central Wisconsin and he was educated in the public schools there. He had a liking for mechanics, however, and after some years in a printing office he became half owner of a machine shop, where he carried on repairs to a variety of local machinery. In 1878 he removed to Colorado and ran a locomotive on the Denver & Rio Grande R. R. for a time.

His bent toward journalism and the printing office was shown by his founding in 1885 the "Daily Press" of Pueblo, Col., which journal he edited for some time.

A number of his articles were contributed to a modest sheet called "Locomotive Engineering," which was published in New York by a company which also published the "American Machinist." In 1888 Mr. Hill was invited to come to New York and take charge of "Locomotive Engineering." Under his charge the journal rapidly increased in importance. Seeing the possibilities in the enterprise, Mr. Hill associated himself with Angus Sinclair, purchased the journal from its owners and undertook to carry it on as a separate publication. In this venture Mr. Hill was both editor and publisher, and his genius was well proved by the phenomenal success of the publication. Its subscription list grew by leaps and bounds, and it rapidly assumed the leading position in its field.

In 1896 Mr. Hill sold his interest in "Locomotive Engineering" to his partner, Mr. Sinclair, purchased the "American Machinist" and laid the foundation for one of the largest enterprises in the field of technical publication ever established.

At that time practically all class publications had their printing done by contract and were limited by such facilities as the printers were willing to provide. Mr. Hill's early experience in the printing business had given him a strong liking for this side of the publishers' work, and he was ambitious that his publication should be able to own and operate its own printing plant. In or-

der that such a printing plant shall be commercially successful, however, it cannot concentrate its work upon a single journal, but must be able to distribute it over a number.

It was this situation among others which led Mr. Hill to add to the successful "American Machinist" other well-established technical journals of high reputation. His first purchase was "Power." Later the "Engineering and Mining Journal" passed under his control. In 1912 he purchased the "Engineering News" from its founder and chief owner, George H. Frost.

To carry on these various publications Mr. Hill organized the Hill Publishing Co., in which, while he held the largest interest, a number of those associated in the conduct of the various journals were also stockholders. A fifth journal, "Coal Age," was established in 1911 to cover a field which it had become evident was too broad to be successfully reached by the "Engineering and Mining Journal," chiefly devoted to metal mining interests.

An enterprise in which Mr. Hill took great pride and to which he devoted some of the best energy of the last years of his life was the construction on the west side of New York City of the great building to house his publications, which was completed in 1914.

Montreal Show Is Social Function

MONTREAL, Jan. 22.—The third annual Motor Show, held under the direction of the Montreal Automobile Trade Association, Limited, was opened to-night by His Honor the Lieutenant Governor of the Province of Quebec, and took place in the basement of Almy's store, where every inch of the 20,000 sq. ft. floor space available was occupied. If the opening night is any criterion as to attendance, it is safe to say that the social recognition formerly given to the Annual Horse Show will be transferred to the Motor Show. The number of cars on exhibition reaches 75, while there are 45 exhibitors at this year's show. A considerable number of commercial trucks are on exhibition which last year were apparently lacking in numbers. Several new cars were shown for the first time, including the National, Davis, Grant, Saxon, Canadian, Briscoe, Crow and Chevrolet.

H. A. L. Ready to Produce

CLEVELAND, OHIO, Jan. 24.—The space leased by the H. A. Lozier Company in the old Royal Motor Car factory aggregates 59,000 sq. ft. The building is protected by a sprinkler system, and the natural and artificial lighting systems are of the best. Contracts for material were all awarded some time ago and the company will go right forward in the manufacture of the H. A. L. 12.

Stevens Bill in Mass Meeting

Bill Before Congress Intended To Prevent Price Cutting

NEW YORK CITY, Jan. 22—A mass meeting to discuss the Stevens Bill was held at Madison Square Garden yesterday in connection with the pure food and drug exhibit. The bill provides that manufacturers may legally fix the price at which their products shall be sold and is designed to eliminate price cutting. Several speakers dwelt on the merits of the bill and the evils of price-cutting, mentioning many specific instances of where a fixed price for a trade-marked article resulted in benefits to manufacturer, retailer and consumer.

WASHINGTON, D. C., Jan. 21—Under the title "To protect the public against dishonest advertising and false pretenses in merchandising" Representative Dan V. Stevens, of Nebraska, to-day reintroduced in the House of Representatives the original Stevens-Ayres bill with a number of important amendments designed to meet the views of many friends of the measure.

The new bill specifically permits discounts for cash and for quantity and for allowances and rates covering costs of transportation. The latest tally shows 209 members of the House in favor of this legislation, which is but nine less than a majority.

90 Per Cent of Cars in Cuba Are American

SANTIAGO, CUBA, Nov. 18—There is a constantly increasing demand for automobiles in Santiago and throughout this consular district. Most of the city and suburban roads are macadamized, and although made several years ago, are in excellent condition. Ninety per cent of the cars already in use are of American manufacture, the remainder being chiefly Italian and French. The greatest demand in this section is for a low or medium priced, strongly built car with a serviceable top for protection against the heavy rains as well as the sun.

Paraguay Sees First Truck

ASUNCION, PARAGUAY, Nov. 11—A representative of an American truck company, who is now traveling in South America, brought to Asuncion on Sept. 22 the first motor truck that has ever been in the Republic of Paraguay.

Numerous demonstrations of the truck were given. The President of the Republic, the Ministers of War and Interior rode on the truck over one of the

worst roads and were favorably impressed. It is probable that several of these trucks will be purchased here. There is a plan on foot to form a transportation company using motor trucks to serve districts not on the railway or river, whose sole means of communication at present consists of bullock carts and pack animals.

Send Catalogs to Venezuela by Mail

WASHINGTON, D. C., Oct. 29—Automobile and parts manufacturers who are sending catalogs and other advertising matter to Venezuela will benefit by the latest report from the United Export Bureau, which states that if the above matter is sent by parcel post it is subject to duty, whereas it is admitted free when sent by mail. When a firm in Venezuela is called upon to pay 40 to 50 cents or more as duty on the catalog of some American maker, sent by parcel post, the usual result is that the catalog is refused and the maker in the United States wonders why his advertising in Venezuela brings little business.

Motoring in France Now Less Difficult

PARIS, Dec. 30—Continuing the relaxation of automobile restrictions outside the actual army zone, the military authorities have given orders that the gates of Paris shall remain open to automobiles until midnight instead of 10 o'clock, as previously. After 12 o'clock only taxicabs without passengers aboard, and going to or from their garages, are allowed through the city gates.

The annual automobile census, to take place this year during the month of December, will be more stringent than usual. Every owner is under an obligation to declare his car to the local authorities, who communicate the lists to the military, and in addition the police and gendarmes have been instructed to keep a look out for hidden cars or trucks. For several months there have been few or no requisitions of private cars, for the army is able to obtain a reasonable number of touring cars from the home factories and supplies from America are available, if required. Unless there are unexpected developments, it is doubtful if the private car owner in France will receive any further attentions from the military. The military registration scheme which allowed any man's car to be seized at a moment's notice was very useful in the first rush of the war, but now that fighting has become almost an established business, it is found more advantageous to go to the factories rather than to individual owners.

Regulations regarding touring are also less stringent outside the active army zone. Instead of fortnightly, monthly

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"All Steel" Touring Car to Cost \$425**New Machine Planned to Be Ready in August This Year**

military passes are given to car owners. These passes are asked for by the police every time an automobile goes through the gates of Paris, but on the open road are only required to be presented at rare intervals, and principally in directions leading to the war zone. In the center, West, South, and Southwest parts of France there are hardly any more restrictions than under peace conditions. A register is maintained in each district of all automobile passes issued, and if any driver is reported as having made an illegal use of his pass he is caught when he presents himself for the monthly renewal. The very simple remedy is to refuse to renew the pass, and as no driver dare run without a permit, an effective control is maintained.

For the war zone exceptionally stringent regulations are in force. Civilian motorists can only travel in this district on obtaining a pass issued by the commanding officer, bearing the photograph and signature of the driver and each passenger, the number of the car and the precise itinerary to be followed. Each military driver not forming part of a convoy, must also possess a special pass, renewable at frequent intervals. As there are guards along the roads with orders to stop all cars, whether carrying civilians, private soldiers or officers, it appears to be impossible for any unauthorized person to travel by automobile in the war zone of France. Any attempt to break through, or to get through with a false pass would entail the confiscation of the car and court martial.

Private motorists outside the war zone are not experiencing any shortage of tires, except a few of the very large and little used dimensions. The standard sizes, such as 105 mm. and 120 mm., which are the two most commonly used, are obtainable in big quantities from practically all the makers, and at normal prices. The gasoline shortage which was rather serious has passed away, and the price has dropped slightly. There is still, however, a feeling of irritation against the big refiners who are popularly believed to have taken advantage of the war to boost the price of gasoline.

Dividends Declared

Willys-Overland; quarterly of 1½ per cent on common, payable Feb. 1 to stock of Jan. 22.

Cincinnati Speedway Gets Land

CINCINNATI, OHIO, Jan. 15—The Cincinnati Speedway Co., which is building a 2-mile board speedway, reports that it has already sold \$410,000 worth of stock and has taken an option on a land site. Plans are at present being developed for the track and buildings and the speedway representative is studying the Sheepscat Bay track at New York.

ST. LOUIS, Mo., Jan. 15—The plant of the All-Steel Motor Car Co., which is being built at Macon, Mo., will be ready for operation early in April it was announced here to-day, following the annual meeting of the officers and stockholders of the company. The company plans to put out a touring car, including starter and electric lights for \$425. If present plans are realized the All-Steel car will be on the market early in August.

E. J. Spencer resigned as president of the company at this meeting and his successor has not yet been named. The new directorate, it is announced, will include Charles L. Smith, designer of the car; Fred V. L. Smith, treasurer of the company; Oscar A. Troricht, secretary; Edward F. Stockho, Andrew C. Duncan and John Hambeacon. Louis Goodhart, formerly traveling representative of the Lewis Spring & Axle Co., manufacturers of the Hollier-Eight, has been appointed sales manager of the All-Steel company.

The company will occupy the plant formerly occupied by the Blees Carriage Co. at Macon, Mo., including four buildings and covering a city block 380 by 300 ft.

Salesmanship Congress at Detroit July 2

DETROIT, MICH., Jan. 24—From July 2 to 6 Detroit will entertain several hundred visitors who are expected to participate in the first "World's Salesmanship Congress" which will be held at the Detroit Board of Commerce.

As might well be expected the automobile industry will have a big share in this event and many prominent men connected with it are either members of the executive committee or of special committees. Among those who are executive members are Hugh Chalmers, president of the Chalmers Motor Co., Harry W. Ford, president of the Saxon Motor Co., Norwell A. Hawkins, manager of sales of the Ford Motor Co., E. Leroy Pelletier, advertising manager of the Reo Motor Car Co. and the Reo Motor Truck Co., W. C. Standish, resident manager of the U. S. Tire Co.

Mr. Pelletier is chairman of the publicity committee of which the other members are Lee Anderson, commercial manager of the Hupp Motor Car Co., Frank G. Easton, advertising manager, Packard Motor Car Co., Theodore F. MacManus of the Dunlap-Ward Advertising Co., Frank V. Martin of the Banker &

Martin Co. and Julian C. Weed of the Timken-Detroit Axle Co. Among the members of the finance committee are Paul Smith, sales manager of the Chalmers Motor Co. and L. D. Robertson, manager of the Detroit branch of the Packard Motor Car Co.; H. H. Hills, general sales manager of the Packard Motor Car Co., is a member of the arrangements committee.

McCulla Returns to Packard

DETROIT, MICH., Jan. 22—W. R. McCulla, will return to the Packard Motor Car Co. Feb. 1. About a year ago he left Packard to take the position of assistant chief engineer of the Knox Motors Co., Springfield, Mass., and has been in Europe much of the time studying war truck conditions for his company. Prior to that he was associated with Packard in the research engineering department, coming to this company from the Hudson Motor Car Co., where he had been in the experimental end of the business. McCulla will resume research engineering work at the Packard factory, specializing on aviation.

Bayerline & Daly's New Car

DETROIT, MICH., Jan. 22—Details of the new car that is to be built by the manufacturing concern formed by J. T. Bayerline, former president and general manager of the King Motor Car Co., and W. L. Daly, who was general sales and advertising manager of the same concern have been divulged in part. It is understood that the car is to be a six-cylinder, 3½ by 4½, to sell at \$900 as a five-passenger. The wheelbase will be 114 in., tires 32 by 3½. Rear springs are cantilever, the axle floating, the clutch a multiple disk. The price of \$900 is to include a convertible top, in addition to the regular equipment.

Trailer Steers with All Four Wheels

FLINT, MICH., Jan. 22—Nickle Bros. who have a wagon shop here have brought out a new automobile trailer which it is claimed has many novel features. Each of the four wheels is placed on a circle similar to the fifth wheel of an ordinary wagon. The left hind wheel and the right front wheel are connected through long rods. Also the right rear wheel with the left front wheel so that when the front wheels are turned in one direction the rear truck turns the opposite way, the wheel traveling upon the circumference of a circle the diameter of which may be as small as 20 ft. For the present the trailer is made with only a light wagon type of body to carry a load of 1500 lb. Heavier style bodies will be made. The members of the firm are William J. and Samuel Nickle, veteran wagon builders.

Portage Sales Increase

Tire Co. Closes Prosperous Year—Slashes Goodwill Figure by \$100,000

BARBERTON, OHIO, Jan. 24—The Portage Rubber Co., this city, has just issued a report to its stockholders which states that the company's directors have marked down their valuation of the company's trademarks, patents and good-will \$100,000. It is stated that the board contemplates further reduction from time to time.

The company has sent out a condensed balance sheet as of Nov. 30 last, which shows gross sales for the twelve months ended on that date were \$1,067,858, as against \$661,848 the previous year, showing an increase of 61.3 per cent. Total profits were \$129,005, as against \$88,102, an increase of 46.4 per cent. The balance sheet follows:

Assets	
Cash	\$60,185
Receivables	250,697
Stock on hand (raw and finished)	284,842
Real estate and plant	337,979
Trademarks, good-will, patents	496,000
Other patents	15,536
Total	\$1,445,240
Liabilities	
Payables	\$10,807
Reserve (depreciation)	6,992
Preferred stock	750,000
Common stock	500,000
Surplus	177,441
Total	\$1,445,240

Markets Easier

NEW YORK CITY, Jan. 25—Market prices last week were easier. Prices on those commodities which have seen violent rises during the past few weeks, either remained constant or were lower. Steel prices were unchanged, though the big demand by the manufacturers was as urgent as it has been during the past few weeks. The lead and copper markets, however, continue to rise, the for-

mer closing yesterday at \$6.10 per 100 lb. and the latter at 25 cents a pound. Tin on the contrary, rose yesterday to \$42.50 per 100 lb. or a net gain of \$1.37 for the week. This metal has always been subject to violent changes, however and so the latter rise cannot be taken as a mark of further violent changes.

The rubber market was quiet last week and prices were somewhat unchanged. Para which earlier in the week reached the 88-cent mark, declined to 86 cents, yesterday, and the Ceylon pale crêpe made a gain of 1 cent, making the closing price 93 cents. There was a large demand for rubber all during last week.

Gasoline in this city remained dormant, closing at 22 cents a gallon. No new features developed in the refined situation last week. There was no further chartering of freight room for export of the oil, but the domestic demand continued good. Cold weather is still interfering with the development work in the Eastern fields, according to advices from Pittsburgh. The few wells to reach completion are located in the old districts and all are light or dry. There is no improvement in the size of the late completions in the southeastern Ohio fields.

\$500,000 Garage Combine in Cincinnati on Novel Plan

CINCINNATI, OHIO, Jan. 14—Steps are being taken to form a combination of seven garages in Cincinnati and Covington, which will be controlled by a corporation with \$500,000 capital stock. Those interested in the movement are W. L. Voight, William Junclas, C. Sandman and Col. P. Wing.

Plans for the latest garage in the combine have been completed. It will be located at Fifth and John Streets and will cost about \$35,000. It will be a two-story building and will have entrances on both Fifth and John Streets.

It is planned that the stockholders, instead of paying monthly rental for keeping their cars both in the suburbs and in the downtown section, will pay but one rental and will be permitted to use any garage in the combine.

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum	.53	.53	.53	.53	.53	.53	...
Antimony	.42½	.42½	.42½	.42½	.42½	.42½	...
Beams and Channels, 100 lb.	2.17	2.17	2.17	2.17	2.17	2.16	— .01
Bessemer Steel, ton.	32.00	32.00	32.00	32.00	32.00	32.00	...
Copper, Elec., lb.	.24¼	.24¼	.24¼	.25	.25	.25	+ .00¾
Copper, Lake, lb.	.24¼	.24¼	.24¼	.25	.25	.25	+ .00¾
Cottonseed Oil, bbl.	9.10	9.10	9.00	9.00	9.10	9.08	— .02
Cyanide Potash, lb.	.28	.28	.28	.28	.28	.28	...
Fish Oil, Menhaden, Brown	.50	.51	.51	.51	.51	.51	...
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	...
Lard Oil, prime	.93	.94	.94	.94	.94	.94	+ .01
Lead, 100 lb.	5.90	5.90	5.90	6.10	6.10	6.10	+ .20
Linseed Oil	.73	.73	.73	.74	.74	.73	...
Open-Hearth Steel, ton.	33.00	33.00	33.00	33.00	33.00	33.00	...
Petroleum, bbl., Kansas, crude	1.25	1.25	1.25	1.25	1.25	1.25	...
Petroleum, bbl., Pennsylvania, crude	2.25	2.25	2.25	2.25	2.25	2.25	...
Rapeseed Oil, refined	.98	.93	1.05	1.05	1.05	1.10	+ .12
Rubber, Fine Up-River, Para.	.88	.88	.88	.88	.87	.86	— .02
Rubber, Ceylon, Pale Crepe	.92	.92	.93	.94	.94	.93	+ .01
Sulphuric Acid, 60 Baume	2.00	2.00	2.00	2.00	2.00	2.00	...
Tin, 100 lb.	41.13	41.25	41.63	41.75	41.75	42.50	+ 1.34
Tire Scrap	.05¾	.05¾	.05¾	.05¾	.05¾	.05¾	...

French Exhibition Planned for May

Big Scheme on Foot to Hold Show of French and American Industry in Paris

NEW YORK CITY, Jan. 24—Although the end of the war is still in the distance the nations whose territory has been overrun and destroyed are already thinking and planning for the reconstruction of the devastated cities, towns, villages and farms. To assist in this matter several European nations have already sent commissions to various countries to ascertain what these various countries can supply to meet the great need. It goes without saying that it will cost a great deal more to repair the damage done than it has cost to defend against the damage. The French commission has been in America for many weeks making examinations of American goods and capacity. In an interview in Washington in December, Monsieur Damour made the following statement:

"It is our hope and purpose with the co-operation of American manufacturers to reconstruct the industries of France and re-develop its agriculture along the most modern lines. Above all to install machinery of the latest type to take the place not only of the men and horses which will be lacking at the end of the war, but of the old methods, and to enable her to produce her specialties in a most economic fashion. The Chamber of Deputies is now sending men all over France to make investigations into conditions to find out just how many machines will be required and what improvements in building and equipment can be best installed."

Every country in Europe whether belligerent or neutral, is in very great need of practically everything in the line of machinery and building materials. One of the reasons for this condition is that it has been the custom of the European countries each to depend upon the other for a large percentage of their needs and now owing to the war and the impossibility of either manufacturer or communication with the markets of Europe of every country are wanting in a large percentage of their requirements. This condition will doubtless continue for a long time after the war closes.

It is stated that the exposition has been financed in a manner satisfactory to the Government of France. For a partial reimbursement of this expense the American exhibitors will be charged eight francs per square meter for space plus 1 per cent of the sales contracts made during the exposition. Space for outdoor exhibits will be much less. Space will be reserved in response to cable or

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Automobile Issues Active

General Motors and Chevrolet Strong with Substantial Gains—Packard Down

NEW YORK CITY, Jan. 25—The automobile and accessory securities showed more activity last week and prices were higher. A strong tone developed during the latter part of the week and several of the issues showed marked gains.

General Motors and Chevrolet, which have been more or less prominent on the stock exchange on account of the proposed merger, came to the fore last week with gains of 21 and 10 points, respectively, General Motors reaching 486 and Chevrolet 132. It is stated by a few of the holders of General Motors that many of the people interested in that stock are holding it at the present time until it reaches the 500 mark. Firestone and Kelly-Springfield Tire common showed considerable strength. It is stated of the latter company that trading in its issues will start on the local exchange early next month. The application will be made just as soon as the new certificates are ready.

The new stock will not share in the dividend payable Feb. 1. The company, it is stated, will probably show earnings for the year ended Dec. 31 last of over 28 per cent for the common stock.

International common and preferred showed a substantial gain for the week. The common went up 7 points, while the preferred rose 3 points. This company last year closed one of its most success-

ful periods. Domestic sales in December, it is stated, made a new high record, and for the full 1915 year home business increased 20 per cent over 1914. Peerless stock went up 8½ points on rumors of placing that issue on a dividend basis within the next few months.

A few of the stocks, however, made considerable drops in prices. Packard common went down 22½ points, while that of Studebaker dropped 3½ points. Texas stock dropped 13 points; Willys-Overland common closed 4 points lower. Maxwell, U. S. Rubber, Stewart-Warner, Swinehart Tire, Goodrich and Chalmers, showed decreases ranging from a fraction to 2 points.

General Motors and Continental Motor featured the Detroit issues with gains of 25 and 13½ points, respectively. The market on the whole was stronger last week, with the exception of one or two stocks, which were lower on both the Detroit and New York exchanges. These were Packard and Maxwell. Packard common dropped 21½ points on the Detroit exchange, and the Maxwell stocks all showed small losses.

Gasoline Selling at 29 Cents in New York

NEW YORK CITY, Jan. 25—At the present moment in New York 30-cent gasoline is not an actuality; but 29-cent gasoline is. That is to say, some distributors are asking that much for it. Tank-wagon gasoline is 22 cents; garages are selling it for from 25 cents up—nearly always up, and considerably so.

Last August the tank wagon price was 14 cents in New York; thus the advance is 8 cents, or a little more than 57 per cent.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Ajax Rubber Co. (new).....	..	..	71½	71½	+ ¼
Aluminum Castings pfd.....	95	100	..	..	..
J. I. Case pfd.....	75	85	86	88½	+ 1
Chalmers Motor Co. com.....	96	120	150	..	..
Chalmers Motor Co. pfd.....	90	93½	100	103	- 1
Chevrolet Motor Co. ....	..	..	132	135	+ 10
Electric Storage Battery Co.	48½	49½	63	64	..
Firestone Tire & Rubber Co. com.	371	376	730	..	+ 10
Firestone Tire & Rubber Co. pfd.	109	111	112	..	..
General Motors Co. com.....	90½	91½	486	500	+ 21
General Motors Co. pfd.....	94½	95½	112	114	- 1½
B. F. Goodrich Co. com.....	30½	30½	71½	72	- 1½
B. F. Goodrich Co. pfd.....	96	98	110	111	- 2
Goodyear Tire & Rubber Co. com.....	194	196	338	342	..
Goodyear Tire & Rubber Co. pfd.....	101	103	114	..	..
Gray & Davis, Inc. pfd.....	..	..	..	..	..
International Motor Co. com.....	..	1	23	25	+ 7
International Motor Co. pfd.....	..	8	38	42	+ 3
Kelly-Springfield Tire Co. com.	94	96	*296	298	+ 6
Kelly-Springfield Tire Co. com. (new) .....	..	..	74½	75	+ 1½
Kelly-Springfield Tire Co. 1st pfd.	82	83	95	97	..
Kelly-Springfield Tire Co. 2d pfd.	105	108	73	74	..
Maxwell Motor Co.	17½	18	66½	67	- 1½
Maxwell Motor Co. 1st pfd.	53½	54	88½	88½	- ¼
Maxwell Motor Co. 2d pfd.	21	22	53	53½	- ¼
Miller Rubber Co. com.....	158	165	260	270	..
Miller Rubber Co. pfd.....	101	103	113	115	..
New Departure Mfg. Co. com.....	..	120	..	..	..
New Departure Mfg. Co. pfd.....	101	..	162½	172½	- 22½
Packard Motor Car Co. com.....	100	..	..	..	..
Packard Motor Car Co. pfd.....	93	95	102	104	- ½
Paige Detroit Motor Car.....	..	..	710	..	..
Peerless Motor & Truck Corp. ....	..	..	38½	39	+ 8½
Portage Rubber Co. com.....	30	36	70	72	..
Portage Rubber Co. pfd.....	80	85	102	106	..
Regal Motor Co. pfd.....	..	..	11½	..	..
Reo Motor Truck Co.	12	12½	25	26	+ 2
Reo Motor Car Co.	25½	26	32	33	..
Splitdorf Electric Co. pfd.....	..	..	..	..	..
Stewart-Warner Speed. Corp. com.....	50½	52½	188	89½	- 1

	1915		1916		Wk's Ch'ge
	Bid	Asked	Bid	Asked	
Stewart-Warner Speed. Corp. pfd.....	100	102	1108	..	..
Studebaker Corp. com.....	41½	42½	153½	154½	- 3½
Studebaker Corp. pfd.....	94½	96	110	112	- 1
Swinehart Tire & Rubber Co.	69	71	87	90	- 1
Texas Co.	133	134	209	210	- 13
U. S. Rubber Co. com.....	57	57½	54½	55	- ½
U. S. Rubber Co. pfd.....	102½	104	107½	108½	- ½
Vacuum Oil Co.	199	201	230	235	..
White Motor Co. (new).....	..	..	49½	50	- 1
Willys-Overland Co. com.....	91½	92	221	225	- 4
Willys-Overland Co. pfd.....	93	95	110	113	..

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

	ACTIVE STOCKS		
Chalmers Motor Co. com.....	..	96½	..
Chalmers Motor Co. pfd.....	90	93½	100
Continental Motor Co. com.....	175	200	265
Continental Motor Co. pfd.....	..	91	..
Ford Motor Co. of Canada.....	475	..	410
General Motors Co. com.....	89½	91½	475
General Motors Co. pfd.....	94½	95½	112
Maxwell Motor Co. com.....	16½	18	65
Maxwell Motor Co. 1st pfd.	52½	54½	86½
Maxwell Motor Co. 2d pfd.	20	21½	51
Packard Motor Car Co. com.....	..	100	160
Packard Motor Car Co. pfd.....	93	..	103
Paige-Detroit Motor Car Co. ....	..	..	700
Reo Motor Car Co.	25	25½	32½
Reo Motor Truck Co.	12	12½	26½
Studebaker Corp. com.....	40	42	153
Studebaker Corp. pfd.....	93½	95½	114

	INACTIVE STOCKS		
Atlas Drop Forge Co. ....	..	25	31½
Kelsey Wheel Co.	185	..	295
SW. K. Prudden Co.	19	20	33
Regal Motor Car Co. pfd.....	..	25	15

*Old. †New. ‡And accrued dividends. §Par value \$10. ¶Ex dividend.

Over in Newark the tank-wagon price is 21 cents; it was 11 cents last August. The lower price in Jersey is attributed to the fact that transportation across the Hudson is quite an item. The ordinary ferries and car ferries will not take the inflammable stuff, so it has to be ferried across the Hudson in special lighters, in steel barrels; it cannot be unloaded from the lighters until it can be loaded directly on trucks; and it must be emptied direct from the barrels, one by one, into the dealers' tanks. Then the empty barrels have to be returned whence they came.

The New York price is not the peak price, however. In Tucson and Douglas, Ariz., the price is 22.5 cents; in Boston it is 23 cents; and Santa Fe, N. M., seems to roost on the pinnacle with 25.5 cents, tank-wagon.

Chicago tank-wagon gas is 16.5 cents; last August it was 10.5 cents. For Minneapolis the corresponding figures are: 16.5 and 11.5; for New Orleans, 17.5 and 12; for Omaha, 15 and 10; for Philadelphia, 21 and 13; for Portland, Me., 22 and 15 and for Portland, Ore., 16.5 and 12.

Cleveland is paying 16 cents, Cincinnati, 21 and Chicago, 16.5; Los Angeles pays 16 and San Francisco, 15; Pittsburgh, 22; St. Louis, 15.9 and Kansas City, 15.8; Seattle is at the bottom of the list with 14 cents—an increase of only 2 cents since last August.

The reasons to which the price rise is attributed are more or less obvious with one or two exceptions. The large increase that has taken place in the employment of farm tractors is responsible for a considerable increase in the demand for fuel; in Central Illinois, for instance, the farmers keep their tractors going all the year round. The huge increase in the number of cars used is a vital factor; there were about a million and a half cars in use a year ago, and now there are about two millions. It is anticipated that next summer there will be close to two and three-quarter millions, all using gasoline at the rate of about 500 gal. a year. That makes a great many gallons—1,375,000,000 of them.

The refiners' plaint is that the cost of crude has increased enormously and that the crudes yielding the greatest percentage of gasoline are the rarest; moreover, the percentage of gasoline yielded is decreasing, taking the country as a whole. Roughly averaging the country's crude product, it will yield about 12.5 per cent of gasoline; 17 per cent is considered a very good proportion indeed, and some oils are not worth working for the gasoline they will give.

The war—of course—is mixed up in it, for the supplies from Russia which came through the Dardanelles are cut off and the strain on the home industry increased just so much.

Five More Tire Rises

Ajax, Fisk, Hardman, McGraw and Federal Announce Increases from 10 to 20%

NEW YORK CITY, Jan. 22—Five more tire companies have fallen in line with the price increases of the other concerns, started by the Kelly-Springfield company around the first of Jan. The latest are Ajax, Fisk, Hardman, McGraw and Federal, making a total of sixteen. It is expected, however, that several of the remaining concerns have already adjusted their prices to a new schedule. One of the companies, namely, the Republic, announcement of whose increase in prices was made last week, instead of making a general increase, has merely adjusted its prices, in some cases the prices being as much as a dollar lower on its plain tread type. The non-skids, in the majority of the sizes, are about 10 per cent higher.

The rearrangement of prices of the five new tire companies to announce increases range from 10 to 20 per cent. The largest increase was made by Hardman, whose prices are 10 to 20 per cent higher. Ajax ranges from 10 to 15 per cent; Fisk is 10 per cent higher, and Federal is also 10 per cent higher.

A number of the tire companies which did not announce an increase in prices were swamped with orders from those automobile owners who wished to lay in a supply of tires before the rise.

This increase of prices, it is stated, will not cover the increases that have already taken place in the prices of crude rubber and other materials used in the manufacture of tires.

Although the majority of the companies have increased the prices on most of the popular-sized tires, a few of them have in some instances made no changes whatever. For instance, the Hardman company has made no changes on the 30 x 3 1/2 and 31 by 3 1/2 non-skid. The 32 x 3 1/2 non-skid has only been raised 10 cents, from \$26. The Republic company has made a change on its 28 x 3 plain tread, the price going up 10 cents.

The following lists will give the prices on a few of the popular-sized tires:

FISK

Size	Plain Tread		Non-Skid		
	New Price	Old Price	New Price	Old Price	
30 x 3 1/2	\$12.75	\$11.60	30 x 3 1/2	\$13.40	\$12.20
34 x 4	21.35	19.40	34 x 4	22.40	20.35
36 x 4 1/2	30.10	27.35	36 x 4 1/2	31.55	28.70

HARDMAN

30 x 3	\$15.00	\$14.10	36 x 4	\$41.50	\$36.20
36 x 4	34.00	29.60	36 x 4	50.00	42.30
36 x 4 1/2	42.30	38.10	36 x 4 1/2	50.00	42.30

FIRESTONE

28 x 3	\$9.80	\$8.90	28 x 3	\$10.95	\$9.95
36 x 4	23.00	20.90	36 x 4	25.75	23.40
37 x 5	39.10	35.55	37 x 5	43.80	39.80

REPUBLIC

28 x 3	\$10.70	\$10.60	28 x 3	\$12.40	\$15.15
30 x 3 1/2	14.80	14.75	30 x 3 1/2	17.35	21.70
34 x 4	24.80	23.80	34 x 4	29.10	31.15
36 x 4 1/2	35.00	34.20	36 x 4 1/2	41.00	41.85

DIAMOND

Popular sizes increased 10 per cent; other sizes 25 per cent. Advanced Jan. 18.					
30 x 3 1/2	\$12.75	\$11.60	30 x 3 1/2	\$13.40	\$12.20
34 x 4	21.35	19.40	34 x 4	22.40	20.35
36 x 4 1/2	30.10	27.35	36 x 4 1/2	31.60	28.70

FEDERAL

Popular sizes increased 10 per cent; other sizes 15 per cent. Advanced Jan. 18.					
30 x 3 1/2	\$13.40	\$12.15	30 x 3 1/2	\$14.75	\$13.95
34 x 4	22.40	20.35	34 x 4	24.65	23.40

McGRAW

Popular sizes increased 10 per cent. No increase on other sizes. Advanced Jan. 18.					
30 x 3 1/2	\$12.75	\$11.60	30 x 3 1/2	\$13.40	\$12.20
34 x 4	21.35	19.40	34 x 4	22.40	20.35

NASSAU

No advance yet. Advance expected Feb. 1.

Austrian Tire Made of Wood Fiber

VIENNA, VIA LONDON, Jan. 15—An Austrian engineer named Von Dunikowski has applied for a patent on a tire, consisting of wood fiber and certain binders. The specifications show that the tire follows the old pneumatic principle in every detail, there being an inner tube and an outer tire. The main material used is willow and birch fiber. What the binder consists of has not been revealed, but it is known that no rubber whatever is used. It is stated that an automobile fitted with the new tires ran 437 miles and showed no signs of undue wear.

Materials Cramp Tractor Output

MOLINE, ILL., Jan. 18—The Moline Plow Co. reports a marked scarcity in raw materials needed in the manufacture of tractors, resulting in a marked handicap in the production of this machine. Orders are heavy, but lack of steel and the difficulty in getting orders filled, due to the heavy demand on account of the war abroad, promises to greatly reduce the output of the Moline plant. Some varieties of steel have increased 60 per cent in price, while one grade has advanced 70 per cent. Despite the fact that prices for machines must necessarily be increased proportionately to the cost of steel and other raw materials, business does not appear to be affected.

Gasoline from Gas in Texas

DALLAS, TEX., Oct. 23.—Several plants for the manufacture of gasoline from natural gas will be built in Texas within the next few months. It is stated there are now about fifty plants in Oklahoma manufacturing gasoline from casing-head gas, or gas which comes direct from the well with crude oil, formerly a waste product. The total output of these Oklahoma plants is about 80,000 gal. of gasoline daily. In California there are said to be about twenty plants of this kind with a total daily capacity of 35,000 gal. It takes about 500 cu. ft. of gas to yield 1 gal. of gasoline.

Armored Cars for N. Y. State

Squadron Expected to Be Ready in April—Eight Cars in All

NEW YORK CITY, Jan. 24—The armored motor car squadron to be presented to the State of New York by a group of prominent men is expected to be ready by April. It will consist of eight armored battle and cruiser cars, including an officers' car, tool car, tank car and emergency car. This will be the first armored car squadron in America, and since the plans for the enlargement of the United States army call for motor cars of a similar type it is expected that this will be a stimulus to the national equipment.

The donors of the cars are E. H. Gary, Henry C. Frick, Robert M. Thompson, Dudley Oleott, James N. Wallace and Harry G. Montgomery. In all the plans for the squadron no expense has been spared. The steel for the cars is the standard United States 0.3-in. bullet-proof gun-shield metal. The frames are built by the American Bridge Co. and the chassis include two Macks, two Locomobiles, two Whites and two Jeffery quads. The commanding officer's car will be built especially for speed. Full electrical equipment is carried and a searchlight on each car will sink into a box when not in use. In order to provide for quick maneuvering the cars will be able to move backward at full speed as well as forward.

Farmers Own 14 Per Cent of Pennsylvania's Automobiles

YORK, PA., Jan. 20—The growing popularity of the automobile on the farm is demonstrated by the fact that Pennsylvania farmers own more than 14 per cent of the automobiles registered in the State during the past year. On the first of the year there were 22,608 automobiles in the hands of the farmers of the State, according to the estimates of the bureau of statistics of the department of agriculture. The reports show that 9.5 per cent of the farmers are car owners and this means that there is an automobile on one out of every ten farms. A year ago it was estimated that there were 15,000 automobiles in the hands of farmers of the State.

In 1915 there were 159,984 automobiles registered in Pennsylvania and the farmers are shown to own 14.1 per cent of that total. Many of the registrations granted by the State were for cars owned by non-residents and the percentage of farmers owning cars is likely to be much higher if the total number of

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State owners could be ascertained. The rural residents undoubtedly led by a fair margin all other classes as purchasers of cars during the year.

In ten out of sixty-seven counties the reports show that from 15 to 18 per cent of the farmers own cars and in thirty-one counties 10 per cent more of the farmers are shown as car owners. Lancaster county leads with more than 18 per cent of the farmers owning an estimated total of 1842 cars. Chester county farmers own 1019 cars and Bucks county farmers 963 cars. In many counties during the year gains of 100 per cent in the number of farmers owning automobiles were common, while in some counties the gain was from 150 to 200 per cent.

Wilmington Wants High Grade Cars

WILMINGTON, DEL., Jan. 24—Prominent in connection with the second annual show of the Wilmington Automobile Trade Association, held here last week, is the fact that the entire Delmarvia Peninsula is under the influence of an unprecedented wave of prosperity. The demand for automobiles has been beyond the dealers' ability to make prompt deliveries.

The most remarkable fact in connection with the industry here is that 75 per cent of all high grade cars sold are to du Pont employees. All makes together are purchased by these people to the extent of about 25 per cent. These employees a little over a year ago were clerks and mechanics earning a moderate salary but to-day are worth many thousands of dollars.

President J. H. Nixon, of the association, states that there is a larger percentage of high grade cars in the State of Delaware than in any other State in the Union and that sales possibilities are great. He substantiated this statement by saying that the per capita wealth is greater than in any other American city.

Must Not Wash Cars with Gasoline

YORK, PA., Jan. 22—The announcement by Fire Chief Harry L. Wills, of this city, that it is the intention of the State to rigidly enforce the act of 1914, providing regulations for the use, storage, sale and keeping of gasoline, naptha and kerosene, will affect more than a score of garages and automobile dealers in this city. The act provides that no person may wash automobiles or any part of an automobile with gasoline or naptha. This will not bar kerosene. One of the clauses set forth in the act is that suitable fire extinguishers must be kept on hand at all times by dealers in oil as well as a box of sand with suitable scoop to scatter the sand.

Vesta Electric Transmission Announced

Clutch and Gearset Replaced by New Device—Direct on High

CHICAGO, ILL., Jan. 24—A new Vesta centrifugal electric generating clutch will be announced later this week by the Vesta Accumulator Co., Chicago. The idea is the combination of the electro-magnetic drag between the armature and fields of any electrical machine and direct friction connection such as is obtained in the ordinary clutch. The Vesta clutch replaces the usual cone or disk clutch, the gearset, the flywheel, the electric generator and the starting motor.

The Vesta system is no new thing in principle, having been brought out in crude form by its inventor, William Morrison of the Vesta company, as long ago as 1898, and described in an engineering magazine at that time.

The system is composed of two parts, the armature and the field, the former constituting the flywheel of the engine and the latter mounted on the forward end of the propeller shaft. The fields are internal and rotate on bearings on the crankshaft extension within the armature. The armature carries an internal commutator and the fields carry the brush holders, the brushes pressing against the internal commutator.

It is in the mounting of these brushes that the real hub of the new idea is incorporated. The brushes are mounted in such a way that the centrifugal force of their rotation, increases the force with which they press against the commutator, in just the same way that the balls of a fly-ball governor swing out with increased speed. When the engine is still the pressure is very light, but as the speed of the car increases the pressure of the brushes against the commutator also increases, until, at high speed there is no slip between the armature and the field. That is, we now have a mechanical clutch, carbon against copper.

Must Label Upholstery in Milwaukee

MILWAUKEE, WIS., Jan. 20—A new law passed by the Wisconsin Legislature of 1915, and effective Jan. 1, 1916, which has generally escaped notice, but is of wide importance, is Section 1418s—3m relative to upholstering or repairing the upholstering of motor cars. The law now in effect requires the branding or labeling of the upholstery to show the kind of materials used. It is regarded as a measure to promote sanitation. The statute reads as follows:

"Any person upholstering or reupholstering any furniture or automobile box-spring or any other article or thing whatsoever, or who manufactures for sale, offers for sale, sells or delivers or who has in his possession with intent to sell or deliver any goods or article of any kind containing upholstering, without a brand or label as provided in subsection 3n of this section, or who removes, conceals or defaces the brand or label thereon, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not less than twenty-five dollars (\$25.00) nor more than five hundred dollars (\$500.00), or by imprisonment in the county jail not to exceed six months, or by both such fine and imprisonment.

"(3n) The brand or label provided in subsection 3m of this section shall contain, in plain print in the English language, a statement of the kind of materials used in the filling and in the covering of such upholstery or reupholstery, to be specified in true terms according to the grades of filling and covering used by upholsters or reupholsterers, whether such materials are, in whole or in part, new or secondhand, the qualities of the materials used, and whether the materials used, if second hand, have been thoroughly cleaned and disinfected. Such brand or label shall be in the shape of a paper or cloth tag to be securely fastened to each article upholstered or reupholstered."

The effect of the statute on manufacturers of motor and other vehicles can readily be discerned. Up to this time there has been no report of violations or arrests, but the situation is such that it should be watched very carefully by manufacturers and dealers.

New Sheridan Light Truck

CHICAGO, ILL., Jan. 22—Numbered among the new commercial car makers is the Sheridan Commercial Car Co., with headquarters in Chicago and factories at Harvey, Ill., which is bringing out a new light commercial car to sell at \$465. It will be equipped with a 2 by 4-in., four-cylinder engine, block-cast, with removable cylinder heads. The carburetor is a Carter, the magneto, Bosch, the clutch a cone and the cooling is by thermo-syphon.

The gearset is selective with two forward speeds. The rear axle is of the floating type and the car is geared 5 to 1 on high, 12 to 1 on low and 12 to 1 on reverse. The maximum speed is said to be 30 m.p.h. The wheelbase is 104 in. In the matter of equipment is found windshield, horn, tools, Prest-O-Lite tank, headlights, delivery body, 43 in. wide, 65 in. long and sideboards 8½ in. high. This body comes with top and side curtains.

British Import Tax Has Small Effect

Greatly Increased Quantities of Parts Going from U. S. A. —Gasoline Importation Reaches Record

LONDON, Jan. 8—In commenting upon the effect of the new British import duty of 33 1/3 per cent on automobiles and parts thereof, the *Times*, which is the leading newspaper of Great Britain, says:

"Although the matter is not one for which definite statistics can be given, in the opinion of men qualified to judge the demand for motor cars continues brisk. Second-hand cars by reputable makers and in reasonable condition command good prices, and such new cars as are available readily find purchasers. As the makers in this country—and the same is true in France—are devoting most of their energies to purposes other than the production of cars, or if they are making cars these are not available to the ordinary buyer, it follows that the demand can not be satisfied from home sources; and in these circumstances American manufacturers, who are said to have turned out over 600,000 cars during the past 12 months, have been enjoying a golden opportunity.

33 1/3 per Cent Has Small Effect

"The import tax of 33 1/3 per cent to which certain motor vehicles of foreign manufacture have been subjected since the end of September on entering this country has, however, introduced a new factor. In September last, according to the Board of Trade returns, the number of complete cars and chassis imported for sale was 2661, with a value of \$2,519,771, whereas last month the number fell to 1806 and the value to \$1,622,515. The figures for last month are far above those for the same month of last year, when the number of cars and chassis was 336 and their value \$460,663; but in view of the disturbed conditions existing last autumn perhaps a fairer comparison is with October, 1913, when the number was 1119 and the value \$1,232,855. In September, 1914, the figures were 197 and \$212,792, and in the same month of 1913 they were 1156 and \$1,290,454. If the effect of the tax, as indicated by the figures for last month, is not so great as might be expected it must be remembered that the returns do not distinguish between cars intended for private use, which have to pay the tax, and those for commercial purposes, which do not; and for anything the official figures show the falling off may have been chiefly, if not entirely, in the former category.

"In passing it may be noted that the tax appeals to different sections of the motor-car trade in very different ways. Manufacturers can regard it with equanimity, at least; and though it can have no immediate effect on firms which are not at the moment making cars for ordinary sale, it may help to secure their position against the time when they are able to start producing again. But to the retailers or agents, through whom in normal times the bulk of the cars made in this country are distributed to the public, the matter presents itself in another light. They rely for much of their livelihood on the profits they receive from selling cars, and if they have no cars to sell those profits naturally disappear.

Gasoline and Parts Are Up

"As regards motor-car tires and tubes and their accessories, which are exempt from import tax, the figures for the last two months are almost identical, the value being \$1,401,270 in September and \$1,398,992 in October; but the value of 'other parts,' which are taxed, actually increased from \$705,088 in the former month to \$1,097,989 in the latter. These figures do not suggest any reduction in the total volume of motoring; and the statistics of the imports of motor spirit, the other chief item besides tires in the running expenses of a car, point to the same conclusion. In September 9,879,103 gal. were imported and duty was paid on 10,766,314 gal., while last month the quantity imported reached the enormous total of 15,982,832 gal. and duty was paid on 10,251,373 gal."

Dry Batteries to Be Dearer

MILWAUKEE, WIS., Jan. 22—That the price of the standard dry battery will advance soon and that material advances are to be expected within the year, was the statement of O. E. Rhuoff, of the French Battery & Carbon Co., Madison, Wis., before the annual convention of the Wisconsin Electrical Contractors' Association in Milwaukee. Mr. Rhuoff attributes the advancing prices to the increasing difficulty in obtaining materials and the heavy demand created by the European war.

Ford's Milwaukee Plant Opened

MILWAUKEE, WIS., Jan. 25—The new Milwaukee plant of the Ford Motor Co. was formally opened on Monday, Jan. 24. The company has experienced considerable difficulty in getting delivery of its machine tool equipment because of the enormous demands upon machinery builders. However, the plant will begin operations on schedule time. A. W. L. Gilpin, manager of the Milwaukee Ford branch, will manage the new works, which represent an investment of \$285,000.

Michigan Is Great Sales Territory

Prosperity of Country Offsets Poor Roads—114,000 Automobiles Registered in State

DETROIT, MICH., Jan. 21—The coming season will be one of the biggest Michigan automobile dealers have ever had. Last year would have been a big year if more cars had been available, but practically every dealer was unable to get enough to supply the demand. This year, however, many of the dealers are stocking cars in anticipation of the spring demand and all of them estimate that their 1916 business will exceed that of 1915 by anywhere from 50 to 300 per cent.

The importance of Detroit as an automobile distributing center is not at all commensurate with its place in the industry. Although it is the automobile capital and is known the world over for its automobiles, the distribution of cars through branches and dealer establishments is not of large proportions.

This is due to the fact that the territory is limited geographically. To begin with, the State is cut in two by water. The lower peninsula is hemmed in on the west by Lake Michigan and on the east by Lake Huron and there is no direct rail connection between Detroit and the upper peninsula without passing through other distributing cities. It is possible, of course, to ship cars from Detroit to the upper peninsula by ferrying the freight cars across the Straits of Mackinaw, but shipping facilities to the upper peninsula are much easier out of Chicago or Milwaukee. Also the western part of the upper peninsula is easily reached from Duluth, which city is making a strong bid for recognition as a distributing center in all trades.

Because of this the distribution by dealers in this city is practically limited to the lower peninsula. Also there are in the lower peninsula several important cities, such as Grand Rapids and Saginaw, which are recognized by the factories as distributing points.

In Flint and Jackson are a number of automobile factories and considerable distribution in the State is done from these points. Fifty miles to the south of Detroit is Toledo, which in many cases includes in its distributing territory the

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southeast corner of Michigan. Chicago, at the lower end of Lake Michigan, also cuts into the State, some of the distributors in that city including a number of Michigan counties in their territory.

Some of the Detroit distributors have a territory that is quite limited. In some cases it includes only three counties. A few have the entire State, but practically none make an attempt to do much with the upper peninsula. The number of dealers used in covering the lower peninsula varies.

While the territory is limited geographically it is a productive area and will add its quota to the increased automobile sales of the country for the coming year. The agricultural interests of the State are diversified and it probably is generally unknown that the State leads in the production of rye, beans, dry peas and chicory. It is second in small fruit and apples; third in pears, grapes, buckwheat and sugar beets; fourth in potatoes, peaches and cherries, and is only ninth in oats, eleventh in barley, twelfth in wheat and fifteenth in corn.

As to live stock its comparative standing is: Sheep, eighth; dairy cows, tenth; poultry, eleventh; bees, thirteenth; horses, fourteenth; cattle, fifteenth; swine, nineteenth.

From these statistics it is at once apparent that the State is healthfully productive in that it is not dependent upon any one staple for its wealth. The crops for 1915 exceeded those of 1914 by more than \$4,000,000 in nine principal products which are shown for three years in the following table:

The prospects for 1916 in agriculture are encouraging and some statisticians go so far as to say that 1916 in the western part of the State will surpass all preceding years. Considerable new ground was cleared last fall and a greater acreage than ever before will be under cultivation when the snow goes away. The Grand Rapids and Indiana Railway Company maintains an agricultural and industrial department which is doing much to develop the section to which it is tributary. The company's agent has advised that the railroad will furnish without cost enough sugar beet seed to plant one-quarter of an acre to all farmers who make request. The only condition is that the agricultural work be carried on according to the company's instructions.

The good roads movement that has

made such headway in Wayne County is spreading through the State and the automobile people look forward to the day when the State shall have a network of good roads. The truck people especially see a wonderful development in that business when the roads are better. As it is now many farmers are using trucks, but the development of sales among these buyers has hardly begun.

The tractor is looked upon as a coming business, especially the small farm machine. A truck man stated as his belief, based upon years in the implement and truck business, that the automobile dealer would be the tractor dealer of the future except in those tractors which are made by implement manufacturers. These companies, he said, will turn the factory business over to their implement dealers because in so doing they can take advantage of an existing organization.

The number of cars registered in Michigan during the past few years follows:

1909	11,718
1910	18,355
1911	27,796
1912	39,579
1913	54,366
1914	76,322
1915	114,845

Automobile Reserve Corps for St. Louis

ST. LOUIS, Mo., Jan. 19—The question of organizing a St. Louis branch of the proposed National Automobile Reserve will be placed before the entire membership of the Automobile Club of St. Louis at a meeting early in February, it was announced here to-day by F. M. Flesh, president of the club. The club has a membership of about 3000 motor car owners.

Secretary Morse of the club, with a view of obtaining the sentiment of other automobile clubs, wrote to organizations of nearly every big city in the country and the answers he received indicate that a majority of the automobile clubs are strongly in favor of an automobile reserve.

Over 100 Cars at York Show

YORK, PA., Jan. 21—At least \$500,000 worth of automobiles will be exhibited at the first annual automobile show of the York Automobile Dealers' Association to be held in this city Feb. 1 to 5. More than 100 cars, it is estimated, will be shown by the score or more of automobile and automobile accessory dealers in this city.

Iowa Loses Its License Tags

DES MOINES, IOWA, Jan. 22—Two car-loads of automobile number plates for the State of Iowa have been lost in transit between St. Paul and Des Moines, and as a result the State automobile department is 25,000 number plates behind its orders for 1916. The number of registrations for the year already has passed 65,000.

MICHIGAN CROPS VALUE

	1915	1914	1913
Corn	\$38,080,000	\$42,210,000	\$37,595,000
Wheat	20,652,000	17,835,000	11,371,000
Oats	22,491,000	22,838,000	17,550,000
Rye	5,138,000	5,402,000	3,324,000
Potatoes	11,729,000	13,213,000	17,808,000
Hay	42,188,000	36,132,000	33,012,000
Barley	1,555,000	1,521,000	1,265,000
Buckwheat	626,000	748,000	630,000
Beans	12,792,000	11,086,000	7,892,000
	\$155,251,000	\$150,985,000	\$130,447,000

Factory Miscellany

Standard Welding Adds—The Standard Welding Co., Cleveland, Ohio, is building an addition to its plant at 1280 West Seventy-third Street, that will cost about \$15,000.

Perfection Spring Buys Land—The Perfection Spring Co., Cleveland, Ohio, has purchased two parcels of land adjoining its present buildings on which an addition will be built.

Nice Ball Bearing Co. Formed—B. G. Nice, Frank Beemer, S. W. Nice, George Wells and George Hoppes of Philadelphia are the incorporators of the Nice Ball Bearing Co., which is being organized to manufacture anti-friction bearings and machines for that purpose.

Sporub Tire Co. Formed—The Sporub Tire Co. has been organized in Milwaukee to manufacture and market a new type of puncture-proof tire employing a resilient filler to take the place of the usual inflated inner tube. Offices and store have been opened at 721 Grand Avenue, Milwaukee. Rudolph Fischer is general manager.

Avery Buys Kingman Plant—The Avery Co., Peoria, Ill., manufacturer of tractors and farm machinery, purchased the plant of the Kingman Plow Co., this week for \$80,000, being the largest bidder. The Kingman plant will be used for foundry and warehouse purposes. The Kingman plant covers 14 acres and is located but a short distance from that of the Avery plant.

Sieverkropp Engine Starts Work—The Sieverkropp Engine Co., Eighteenth and Clarke Streets, Racine, Wis., manufacturing gasoline engines, self-starters and other devices and appliances for the automobile trade, has started work on the erection of a plant of its own at DeKoven Avenue and the North-Western tracks, Racine. The site is 185 by 154 ft., and the first unit of the new plant will be 50 by 100 ft. The concern intends to erect another shop upon the completion of the factory. About 75 to 100 employees will be added to the payroll as soon as the extensions are completed.

Large Chevrolet Plant for Oakland—The largest automobile plant on the Pacific coast, the Oakland Chevrolet assembling plant, is to be under construction within a few weeks. The plant is to be located on the electric loop tract close to the Foothill Boulevard, Oakland, Cal. The factory is to have a capacity of 15,000 cars per annum and will cost more than \$200,000. Active work on the plant is to begin before Feb. 1, and the buildings are to be completed by May 15.

Wallis Tractor in Racine—The Wallis Tractor Co., formerly of Cleveland, Ohio, has completed the removal of the plant and offices to Racine, Wis. The company is backed mainly by Racine capital and has been manufacturing a gasoline tractor known as the Cub at Cleveland for two years. The Cub tractor recently traveled cross-country 1000 miles from Cleveland to Fremont, Neb., to the National Power Farming Demonstration. The removal was made to obtain more manufacturing space and better shipping facilities than were available in Cleveland.

The Automobile Calendar

Jan. 25-29.....	Lancaster, Pa., Show, Conestoga Park Pavilion.	Feb. 7-12.....	Duluth, Minn., Show, Armory, Duluth Automobile Dealers' Assn.	Feb. 28-March 3..	Pittsburgh, Pa., Convention of American Road Builders' Assn., Mechanical Hall.
Jan. 22-29.....	Montreal, Que., Show, Albany's Bldg., Automobile Trade Assn., Ltd.	Feb. 8-11.....	Grand Forks, N. D., Show, Auditorium.	Feb. 28-March 4..	Paterson, N. J., Fifth Annual Show, Auditorium.
Jan. 22-29.....	Chicago, Ill., Show, National Automobile Chamber of Commerce; Coliseum and First Regiment Armory.	Feb. 9-12.....	Peoria, Ill., Show, Coliseum, Peoria, Automobile and Accessory Assn.	Feb. 29-March 4..	Ft. Dodge, Iowa, Show, Terminal Bldg., Ft. Dodge Automobile Dealers' Assn.
Jan. 24-29.....	Buffalo, N. Y., Show, Buffalo Automobile Dealers' Assn., Broadway Auditorium.	Feb. 12-19.....	Albany, N. Y., Show.	March 4-11.....	Boston, Mass., Car and Truck Show, Mechanics Bldg.
Jan. 24-29.....	Scranton, Pa., Passenger Car Show, Town Hall.	Feb. 12-19.....	Hartford, Conn., Show, First Regiment Armory, Hartford Automobile Dealers' Assn.	March 8-11.....	Davenport, Iowa, Show, Tri-City Davenport, Rock Island & Moline; Tri-City Automobile Trade Assn.
Jan. 24-30.....	Portland, Ore., Show, Armory, Portland Automobile Dealers' Trade Assn.	Feb. 14-19.....	Nashville, Tenn., Show, Hippodrome. J. A. Mürkin, Mgr.	March 8-11.....	Mason City, Iowa, Show, Armory.
Jan. 25, 26, 27....	Montgomery, Ala., Show, Klein Bldg., Montgomery Automobile and Accessories Dealers.	Feb. 14-19.....	Des Moines, Iowa, Show, Des Moines Auto Dealers' Assn.	March 8-15.....	Brooklyn, N. Y., Show, Brooklyn Motor Dealers' Assn.
Jan. 29-Feb. 5....	Columbus, Ohio, Show, Memorial Hall, Columbus Automobile Show Co.	Feb. 14-19.....	Winnipeg, Man., Show, Ford Plant, Winnipeg Motor Trades Assn.	March 9-11.....	Kenosha, Wis., Show, Kenosha Retail Assn., Kenosha Farmers' Session.
Jan. 29-Feb. 5....	Minneapolis, Minn., Show, National Guard Armory, Minneapolis Trade Assn.	Feb. 17-19.....	Racine, Wis., Show, Lakeside Auditorium.	March 21-25.....	Deadwood, S. D., Show, Auditorium, Deadwood Business Club.
Jan. 31.....	Scranton, Pa., Show, Commercial Car Show, Town Hall. H. B. Andrews, Mgr.	Feb. 19.....	Newark, N. J., Show, First Regiment, Armory, C. G. Fitzgerald, Mgr.	March 28-April 3..	Manchester, N. H., Show, Under Auspices Couture Bros. Academy.
Jan. 31-Feb. 5....	Fall River, Mass., Show, State Armory, R. C. Borden, Mgr.	Feb. 19-26.....	Harrisburg, Pa., Show, Emerson-Bruntingham Co.'s Bldg., Capital City Motor Dealers' Assn.	May 13.....	New York City, Vanderbilt Cup, Sheephead Bay Speedway Race.
Feb. 1-3.....	Frederick, Md., Show, Armory.	Feb. 20-27.....	Grand Rapids, Mich., Show, Klingman Furniture Exhibition Bldg., Automobile Business Assn.	May 20.....	Chicago, Ill., Amateur Drivers' Race, Chicago Motor Speedway.
Feb. 1-5.....	York, Pa., Show, York Auto Dealers' Assn.	Feb. 21-26.....	Bridgeport, Conn., Show, State Armory. B. B. Steibler, Mgr.	May 30.....	Indianapolis Track Race.
Feb. 2-5.....	Buffalo, N. Y., Show, Auditorium, Buffalo Automobile Mfrs. and Dealers' Assn.	Feb. 21-26.....	Louisville, Ky., Show, First Regiment Armory.	June 17.....	Chicago Track Race.
Feb. 2-5.....	Poughkeepsie, N. Y., Show, State Armory.	Feb. 21-26.....	Omaha, Neb., Show, Omaha Automobile Show Assn.	June 28.....	Des Moines, Iowa, Track Race.
Feb. 7-12.....	Kansas City, Mo., Show, J. I. Case, T. M. Bldg., Kansas City Motor Dealers' Assn.	Feb. 21-26.....	Portland, Me., Show, Exportation Bldg.	July 4.....	Minneapolis Track Race.
		Feb. 21-26.....	South Bethlehem, Pa., Show, Coliseum. J. S. Elliot, Mgr.	July 4.....	Sioux City Track Race.
		Feb. 21-26.....	Syracuse, N. Y., Show, Syracuse Automobile Dealers.	July 15.....	Omaha, Neb., Track Race.
				Aug. 5.....	Tacoma Track Race.
				Aug. 18-19.....	Elgin Road Race.
				Sept. 4.....	Des Moines Track Meet.
				Sept. 15.....	Indianapolis Track Race.
				Sept. 16.....	Providence Track Race.
				Sept. 30.....	New York City Sheephead Bay Race.
				Oct. 7.....	Omaha Track Race.
				Oct. 14.....	Chicago Track Race.

The Week in the Industry



O'Neil Fisk's Lowell Manager—C. C. O'Neil has been appointed manager of the Lowell, Mass., branch of the Fisk Rubber Co. of New York whose factory is in Chicopee Falls, Mass.

Ashcroft U. S. Tire Publicity Mgr.—R. W. Ashcroft, of the Canadian Consolidated Rubber Co. of Montreal, has accepted the appointment of manager of publicity of the United States Rubber Co. of New York.

Culver Heads Overland Zone in Atlanta—The Willys-Overland Co. has opened a zone headquarters office in Atlanta, Ga., in the former Locomobile building on Peachtree Street. The office will be in charge of E. N. Culver.

Dunne Now Buick Superintendent—G. W. Dunne, former assistant manager of the drop forge plant of the Buick Motor Co., Flint, Mich., is now superintendent of the Muskegon (Mich.) plant of the Continental Motor & Mfg. Co.

Williams Shifts to Kansas City—W. S. Williams, who was manager of the Studebaker Corp. branch in Dallas, Tex., has been promoted to manager of the more important branch at Kansas City, Mo.

L. B. Alford, who was assistant branch manager in Dallas, is now branch manager, and W. D. Lacey, who was wholesale salesman at the branch, is now assistant branch manager.

Kidder Promoted—E. H. Kidder, who has been manager of the Boston branch of the United States Tire Co. for some years, has been advanced to New England manager, having charge of Boston, Providence, Worcester, Bangor, Portland and Manchester offices with headquarters at the Boston office. J. C. Toomey, manager of the Providence branch, has been brought to Boston to have charge of that territory and H. E. Crocker has been placed in charge of the Providence branch.

Headley Promoted—J. P. Headley, who has been acting for some time as assistant zone supervisor of sales for the Maxwell Motor Corp., has been promoted to the position of special representative, with headquarters in Detroit. His work will be almost entirely in the field and he will travel constantly over the Southeastern States. The Maxwell Company has leased the building at 165 Peachtree Street, Atlanta, Ga., and has sent one of its most experienced salesmen here as manager. C. H. Batchelor will have charge of the salesrooms in that city.

Motor Men in New Roles

Johnson New Seattle Mgr.—Edward Johnson has succeeded J. E. Shellenberger as manager of the Seattle branch of Hughson & Merton, Pacific Coast accessory firm.

Cole Makes Change—W. C. Cole, formerly manager of the used-car department of the Hudson-Phillips Motor Car Co., St. Louis, Mo., has become associated with the Packard Missouri Motor Co. of the same city.

Glazier Wichita Truck Mgr.—J. L. Glazier of Portland, Ore., has been appointed manager for the Wichita Truck Co.'s branch in that city, which will control the Oregon, Washington, Idaho and British Columbia territory.

Johnson St. Louis U. S. Tire Mgr.—O. S. Johnson has been appointed manager of the St. Louis branch of the United States Tire Co., succeeding H. H. Hubbard, who has been transferred to the home office of the company.

White Goes to Toledo—T. W. White, formerly manager for J. W. Leavitt & Co., Overland distributor in Seattle, Wash., has left the Western field for Toledo, Ohio, and will enter the foreign department of the Willys-Overland Co.

Scott Willard Distributor—Sam Scott of Tacoma, Wash., has been appointed exclusive distributor for the Willard Storage Battery Co. for this city. Mr. Scott has organized the Storage Battery Supply Co. He is located with the Pacific Car Co.

New U. S. Branch Mgr.—Howard E. Crocker has been appointed manager of the Providence, R. I., branch of the United States Tire Co. John Toomey, former manager, has been promoted to the management of the Boston branch of the company.

Three Studebaker Men Promoted—Three changes in the Studebaker organization, each in the nature of a promotion, are announced by The Studebaker Corp.

W. S. Williams, formerly manager of the Dallas, Tex., branch, has been appointed manager of the larger branch at Kansas City. Mr. Williams was retail sales manager for the L. Markle Co., Studebaker dealer in Chicago, previous to becoming branch manager in Dallas.

L. B. Alford succeeds Mr. Williams as the Dallas branch manager. Mr. Alford leaves the post of assistant branch

manager, which he held for several years.

W. D. Lacey is advanced from wholesale salesman to assistant branch manager in Dallas, succeeding Mr. Alford.

Little Transferred to N. Y. by Bowser

—E. J. Little, who has been manager of the Fort Wayne sales district of the S. F. Bowser Oil Tank & Pump Works for the past five years, has been promoted to the management of the New York office. Mr. Little succeeds H. C. Carpenter, who has taken charge of the Atlanta, Ga., office. It has been decided to divide the Fort Wayne district, and make out of it the Michigan, Ohio and Indiana districts. L. L. Walker will have charge of the Ohio district. Mr. Walker has had charge of the Philadelphia office. A. S. Bowser, secretary of the company, will look after the Michigan sales district and J. W. Burrows will have charge of the Indiana district. Mr. Bowser has been in Albany, N. Y., for the past several months in the interests of the company, and J. W. Burrows has been chief clerk in the sales department. The Philadelphia office will be discontinued.

Russell-Dewey Co. Formed—The Russell-Dewey Co. has been incorporated with offices at 1790 Broadway, New York City, 1024 Wabash Avenue, Chicago, and Watertown, Mass. The officers are M. A. Dewey, Jr., president, for many years sales manager for N. B. Arnold, Brooklyn, N. Y., manufacturer of Slikup Specialties; C. A. Russell, treasurer, formerly sales manager for Hopewell Bros., manufacturers of the Hopewell tire case and other fabric specialties, and C. A. Hillers, secretary, for the past eight years salesman and New England manager for Hopewell Bros.

The company will act as selling agents for the following companies:

N. B. Arnold, Slikup Specialties; Croxford Auto Rim Tool Co., rim tools; Double Seal Tire Valve Co., tire valves; Flint Motor Plate Co., specialties for Fords; Gibson Hollister Mfg. Co., Jumbo spark plugs; Hopewell Bros., fabric specialties; United Engine & Mfg. Co., garage and shop equipment; Woodbridge Chemical Co., Air-In-Al for punctures. All of which lines will be marketed solely through the jobbers.

M. A. Dewey will make his headquarters at Chicago; C. A. Russell at New York, and C. A. Hillers at Watertown, Mass. These men will cover the Dominion of Canada, and the United States, east of the Rocky Mountains.

Recent Washington News Items— Jamieson Motor Car Co., Spokane, Wash., have been named distributors for Pathfinder and Pullman cars. Sales-rooms have been opened at 1229 Second Avenue. Associated with Mr. Jamieson is C. A. Dudley, as salesmanager. The company has secured the territory from the Cascade Mountains east in Washington, north of Salmon River in Idaho, and the State of Montana as far east as Butte.

Doud-MacFarlane Machinery Co., Tacoma, have recently added two modern machines to facilitate repair work. One will be a cylinder grinding machine capable of grinding from one to six cylinders at a time. The other will be an automatic gear cutting machine, which will cut any size or style of gears.

George Clark and A. C. Olson have formed the Motor Force Co. for the manufacture of a new hydrocarbon product, which is declared to be highly efficient. Salesrooms have been established in Seattle at Pike and Melrose Avenues.

The Auto Tire Repair Shop, Tacoma, Wash., is city distributor of Kelly-Springfield and Republic tires, in addition to making a specialty of quick and efficient repairs of all makes of tires.

H. C. McCulloch, of 1431 Broadway, Seattle, has been appointed Seattle agent for the Federal tire.

The Sunset Electric Co., 606 East Pike Street, Seattle, has been appointed Seattle service station for Gray & Davis starting and lighting systems. The firm also acts as service station for Exide batteries.

Agency for the Gordon tire has been placed with the Pacific Tire & Rubber Co., 604 East Pike Street, Seattle.

Philadelphia Trade News— Alterations are being made at 1617 Chestnut Street, Philadelphia, which when completed will be occupied as a local branch by the Maxwell Sales Corp. of Detroit. The branch will be under the management of L. G. Peed, for five years with the sales organization of the company.

The Philadelphia branch of the H. W. Johns-Manville Co., on North Second Street, is being moved to its new modern home at Broad and Race Streets, recently completed.

H. H. Kirkpatrick of Philadelphia has been made branch manager of the Hardman Tire and Rubber Co., 809 North Broad Street, this city.

The Willard Storage Battery Co., Cleveland, has opened a branch and service station at 1434 Brandywine Street, Philadelphia, and has placed in charge P. M. Evans, who for several years has been chief chemist of the company.

Canadian News Items— The Tyre Shop, Vancouver, B. C., has opened at 1015 Blanshard Street under the management of W. Tergeson, formerly with the Auto Supply Co. and S. V. Marks,

manager for the Tait Tire Co. A modern vulcanizing plant has been installed and all makes of tires will be handled.

The Western Oil & Supply Co., Vancouver, B. C., has been appointed agent for Savage tires and is opening a store at 427 Howe Street.

The Colonial Tire & Rubber Co., Ltd., Vancouver, B. C., has given up the agency for Michelin tires and is now handling Goodyear tires.

The Johns-Manville Co. has opened a new store and offices on Portage Avenue, corner of Edmonton Street, Winnipeg, Man. J. Papineau has been appointed sales manager.

Denver Trade Items— The Quick Service Tire Co. is the name of a new Denver concern formed by J. A. Rayment and E. M. Tucker, formerly salesmen respectively for the Dry Climate Tire Mfg. Co. and the Boss Rubber Co., has opened an agency for Quaker and Batavia tires at 136 Sixteenth Street, facing Automobile Row, on Broadway.

The Highway Auto Sales Co., a \$25,000 corporation, has opened headquarters at 1439 Cleveland Place, Denver, to distribute the Argo and the Crow-Elkhart in Colorado, Wyoming, Utah, New Mexico and Arizona. The officers are S. R. Fitzgerald, president; N. A. Ballou, vice-president; W. C. Pochon, secretary and treasurer; W. Aldridge, general manager. The new firm will also have a branch office at Salt Lake City.

The Mid-West Auto Sales Co., 1512 Broadway, Denver, distributor for the King, Regal and Jackson, has dropped the last two lines and is handling the King exclusively in the Colorado and Wyoming territory.

The Foster Auto Supply Co., a new Denver concern headed by J. W. Foster, formerly manager of the Denver Auto Goods Co., has opened an accessory store at 138 Sixteenth Street, corner of Broadway. The new firm has contracted for the Colorado territory on the Rayfield carburetor, and has secured the Colorado and Wyoming agency for the Eismann magneto, Auburn spark plug, Sioux non-leak piston ring and the Kellogg line of pumps.

The Tibbals-Anderson Motor Car Co., formerly the Regal Sales Co., has given up the Denver agency for the Regal and secured the Colorado and Wyoming distributing agency for the Jackson. The new concern will open headquarters at Broadway and Twelfth Avenue.

The Quinn & McGill Motor Supply Co., 1532 Broadway, has taken the Veedol oil agency for Colorado, Wyoming and New Mexico.

Robert Rhea, secretary of the Boss Rubber Co., 1548 Broadway, has resigned his office and left the firm entirely on account of ill health. Arthur Lewis, vice-president, is acting as secretary temporarily.

Cleveland Changes— A number of automobile dealers have moved to new locations in the past week in Cleveland. Within the next few weeks J. H. Greenwald, Chalmers representative, will move to the large building occupied by the Packard Cleveland Co., 1900 East Thirteenth Street.

The Packard Cleveland Co. will then move to its new building, now under construction on Carnegie Avenue, near East Fifty-fifth Street. The Stearns Motor Sales Co. will occupy the former Chalmers quarters at 2106 Euclid Avenue.

The Hamilton Motor Car Co., Chevrolet distributor, is now located at 2336 Euclid Avenue, formerly occupied by the Cuyahoga Sales Co., Chandler distributor. The Cuyahoga Sales Co. has moved to 4400 Euclid Avenue, formerly the Ford home.

The Oldsmobile Cleveland agency, formerly the Windermere Euclid garage, has moved to 2344 Euclid Avenue, the former Chevrolet home. The Windermere Euclid garage will be used as an Olds service station, and the Olds Lakewood service station is soon to be enlarged to give west-siders service.

The Hills Motor Car Co., which handles the Briscoe and the Pathfinder, has moved from 6110 Euclid Avenue to 6010 Euclid Avenue.

The Albaugh Motor Sales Co. has opened a new service station for Metz and Lewis owners.

Stewart Buys Out Partner— J. T. Stewart of the Stewart-Toozer Motor Co., Omaha, Neb., has purchased the interest of George Toozer, and will henceforth conduct the business under the name of the Stewart Motor Car Co. The company will remain in the same quarters, and has taken on the Mitchell car with the Pierce-Arrow, the former of which replaces the Chalmers agency, recently relinquished. F. C. Hill remains with Mr. Stewart as sales manager.

Nikrent Joins Earle C. Anthony— Louis Nikrent, veteran automobile racer, of southern California, has been appointed the technical expert of the Earle C. Anthony, Inc., Los Angeles, Cal., which organization controls the Packard sales throughout southern California and controls the State territory for the Reo.

The Earle C. Anthony, Inc., has added two branches, one in Bakersfield under the management of C. B. Pentoney, and one in San José, under M. N. Brodie. With the addition of these two houses Anthony is represented by branches in six of the largest cities in California.

Michelin Adds— The Michelin Tire Co., Milltown, N. J., will increase its manufacturing building by an addition measuring 53 by 117 ft. The addition is to be one story, brick walls, and a saw tooth roof.